amateur radio action

Oceania's Amateur Magazine Volume 15 Number 9 $3.50*

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COM 0V
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50Hz
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Safety in the shack —do RCDs really work?

Reviews, lots more

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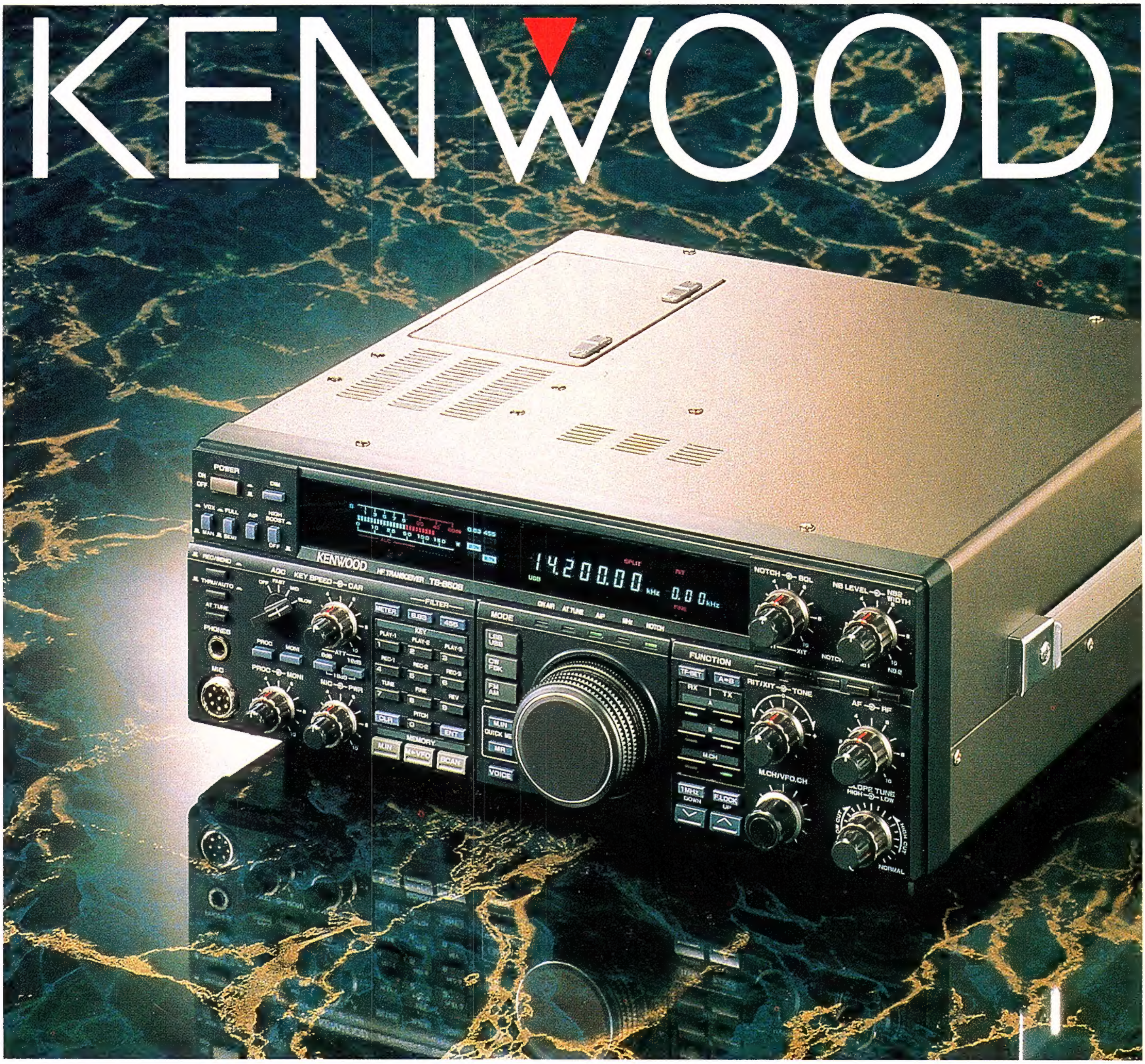

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Volume 15, Number 9 On Sale: 22 December, 1992

Special Features

12 **A NEWCOMER'S GUIDE TO MORSE CODE**: Listening to Morse Code on the air for the first time can be an off-putting experience. Even if you can read the code and write it down error-free, can you *understand* what you wrote down? Many of us cannot, so we asked our resident Morse junkie to translate the... code!

15 **DXPEDITION TO WILLIS ISLAND**: In October 1992 Jim Smith, VK9NS, his wife Kirsti, VK9NL and Atsu from Japan headed out to Willis Island for a one-week stay. Jim recounts the group's adventure...

20 **EQUIPMENT REVIEW — STANDARD C558**: Any smaller and you'd need tweezers to hold it! Here's the smallest twin-band transceiver of the lot — but not a single feature is missing! Tom Moffat, VK7TM, is our judge... If you're a hacker you'll love this one!

30 **ELECTRICAL SAFETY FOR THE SHACK**: Look, this might sound silly, but we'd suggest you try to avoid electrocuting yourself for the time being at least. To make that particular task a bit easier use an RCD. We tell you how, and why — then we tell you how to **WIN A YAESU FT-415**!

36 **ARA AOCP THEORY COURSE — PART 12**: You're not far from your licence tests now. Perservere a bit longer and you'll be there!

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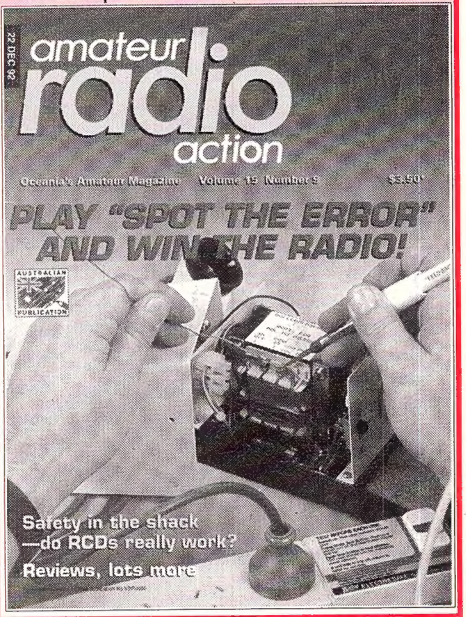
22 DEC 92
amateur radio action
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Safety in the shack
—do RCDs really work?
Reviews, lots more

Cover**: Okay, what's the editor up to here, eh? Could this be his soldering iron he's mucking around with? Okay, okay, so we know that you shouldn't solder inside your iron (it defies logic, anyway!) but you'd be surprised how many people do some pretty darned stupid things where electricity is concerned. We've decided to do our bit to reduce the death and injury toll in this month's magazine. Turn to page 30 for the story, and...* ***you may win a new rig in this issue!

Next issue out January 19. Reserve your copy today!

TO ALL NEWCOMERS

Welcome to **Amateur Radio Action,** the only journal of *amateur radio* in Australia available on the news stands. If you are not a radio amateur, this page may assist you to better understand the hobby sometimes also known as 'ham radio'. It is not possible to tell you all there is to know about amateur radio on one page, but we can at least try to explain what our magazine is all about and where you can discover more about this fascinating hobby.

There are approximately *four million* licensed radio amateurs around the world — some 500,000 of them in the United States and more than 1,500,000 in Japan alone. In Australia, over 18,000 people are licensed as amateurs by the controlling government department, the **Department of Transport and Communications** (DoTC). The **Wireless Institute of Australia,** representing just over one third of Australia's amateur population as members, deals with the department on behalf of Australian amateurs. You can write to the WIA at PO Box 300, South Caulfield, Victoria 3162

People become amateur operators for a variety of reasons, but probably the most important one is that they want to *experiment* in all facets of wireless communication. Unlike CB radio, therefore, the issue of an amateur radio licence requires an examination of the applicant's knowledge of the basic principles of radio and electronics, international radio regulations and, in most cases, the ability to send and receive Morse Code.

While this may seem difficult, people from all backgrounds and age groups have passed these examinations, often with no more assistance than the books available from their local library. Australia has hundreds of amateur radio clubs spread throughout the country, and many of these provide classes for intending amateurs. Some classes are free of charge; others may carry a nominal cost. Many clubs also conduct the examinations you need to pass to get on the air. A list of radio clubs is published periodically in **Amateur Radio Action.** All clubs welcome visitors and new members.

Amateur Radio Action, too, helps people become amateurs. Our year-long AOCP theory course is approaching its conclusion, and we are conducting examinations right here in the middle of Melbourne for those who wish to take advantage of that service. We conduct examinations in all subjects each month in central Melbourne — write to the Editor or ring him on (03) 601 4203 for further details.

In your reading of **Amateur Radio Action** you may encounter some strange and unfamiliar terms. Radio amateurs use a form of 'shorthand' developed from the abbreviations developed decades ago for use with Morse Code. Here are some of them: A **QSO** is a contact with another amateur station. A **QSL** is a card confirming such a contact. The **QTH** is the location or address of an amateur station (often indicating where a QSL card may be sent). **QRP** means low power operation (usually less than five watts output). Oh, and a **QSP** is a message, if you were wondering about the editorial on page 5. **DX** refers to long distance, so a 'DX station' is usually an overseas radio amateur. His 'QSL route' is the address to which a QSL card can be sent. **MF** means 'Medium Frequency' and, to the radio amateur, indicates the long-wave 160 metre band. **HF** means 'High Frequency' and the shortwave bands from 80 to 10 metres. Our access to these bands means that most amateurs are able to contact virtually any point on the earth's surface, day or night. **VHF** means 'Very High Frequency'. Amateurs in Oceania have access to two VHF bands, which are called the six and two metre bands. **UHF** is 'Ultra High Frequency', and includes three amateur bands. Radio amateurs in Australia are permitted to use one MF band, eight HF bands, two VHF bands, three UHF bands and seven **SHF** — *Super* High Frequency — bands.

Amateurs communicate together in many different ways. **CW**, the oldest of our modes, means 'Continuous Wave' and most signals using this mode use the Morse Code. **Phone** means any mode using normal voice operation. Phone modes include AM, or 'Amplitude Modulation' (as used by Medium Wave commercial radio stations); **FM** is 'Frequency Modulation' (as used by the 88 to 108 MHz FM radio stations); and **SSB**, which is 'Single Sideband', a specialised voice mode which uses only half the band space of AM or FM. **RTTY** is 'Radio Teletype', a means of sending and receiving 'hard copies' of messages by radio using a computer or teleprinter machine. **AMTOR** is an advanced form of error-free RTTY. **Packet Radio** is a sophisticated means of linking computers via radio. **PacTOR** marries AMTOR and packet together for fast, error-free transmissions. **ATV** is *Amateur* Television, where amateurs experimenting with 'fast-scan' color TV transmissions can often be monitored on UHF TV channel 34. **SSTV** is 'Slow Scan Television', a means of sending less sophisticated television pictures around the world on the HF bands. Amateurs also send messages via facsimile — just like the fax in your office, only it's via the radio — and have launched more than 20 orbiting satellites which relay normally short-range VHF and UHF signals around the world.

Amateur Radio Action is a mix of news, feature articles and regular columns for radio amateurs and short-wave listeners (SWLs). **QSP** is the Editor's page, usually devoted to matters of topical interest. **NEWS DESK** contains news items, announcements and new product information. **DX & BAND REPORT** contains information of interest to HF operators. The **IPS PREDICTIONS** report provides graphical information which can be used to work out which DX locations might be heard on a particular band at different times of the day from the east and west coasts of Australia. **SHORTWAVE** is a column for short-wave listeners, containing news about shortwave broadcasting stations. **YL FORUM** is a column which promotes discussion of topical and controversial matters from a female point of view.

Amateur Radio Action feature articles cover a wide range of radio-related topics including reviews of new products, equipment construction projects, modifications to equipment, amateur operation in other countries, stories from the early days of radio experimentation (which started with Marconi late last century), antenna construction projects, and discussion of matters affecting amateur radio operation. And, of course, there's much, much more...

We hope you will enjoy reading **Amateur Radio Action** and be stimulated to find out more about this unique and exciting hobby.

amateur radio action

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Newsletter editors and publishers please take note!

QSP

Last month's issue raised quite a few eyebrows, and not just for its editorial content! In fact, it would be fair to say that quite a few people spent a long time examining some of the text trying to decipher just what we were saying. No, your copy wasn't unique, and no, it wasn't intentional.

In an embarrassing slip which could only happen in the world of desktop publishing, the computer used to generate the film from which the printing plates are produced had a corrupted printer font, and *every* incidence of italic text in that particular face on around half of the pages was darned near impossible to read.

This sort of thing doesn't happen often and, despite there being all manner of safeguards trying to prevent it, it *can* happen, and that's what manual 'checks' are all about. The person producing the film at the bureau checks it, the editor checks it, the operator making the printing plates checks it, the printer checks it… and we all completely missed great lumps of illegible text.

As usual, I had produced the pages in two batches, and I *did* check the film in the first batch. That had no problems, but I simply wasn't well enough to check the rest of the pages and these, of course, were the ones which Murphy paid his gleeful attention to. I was full of Asian 'flu at the time and felt far from bright (actually, I was supposed to be in bed at the time!) but that's no excuse and I'm feeling more than a little embarrassed and sheepish sitting here looking at the awful result.

So no, your eyes hadn't failed you — more likely the *words* had failed you instead. You'll find the important 'missing' bits from last month's magazine on page 11 of this month's issue — and it will be very clear and easy to read, I promise you!

Christmas wishes…

On behalf of the team at Syme Magazines and **Amateur Radio Action**, I'd like to take this opportunity to wish you and yours all the best for Christmas and the new year. It seems like just yesterday that I was saying much the same things for last year's festive season. The time *does* fly, doesn't it, but there are also those times when you wish you could wind the calendar one way or another.

The past year hasn't been an easy one for many of us, and our doomed economy really took it on the chin during the year. It was a year of political upheavals, too, and one of great tragedy and disaster in some parts of the world.

For the Australian radio amateur, though, 1992 was a year of mixed blessings. Some very nice new equipment came onto the market (that was the good part!) — but none of us could afford to actually *buy* it (that was the bad part!). And worse is still to come, we're told.

The prices keep going up, but the income doesn't seem to be keeping pace. The Australian dollar is now as popular on the world's currency markets as Kylie Hinch in a Kolm cartoon, and that means some prices are about to undergo even more savage rises. The mid-market Yaesu FT-990, to pick but one example, is set to jump in price by several hundred dollars just to cover currency movements (although the new DC-only variant should go part of the way to compensating) and most other equipment is facing a similar fate.

We'll all have to work hard through the coming year, and can but hope that the current gloom on the financial front won't last much longer. There *must* be light at the end of the tunnel — let's just hope it isn't a train!

That's all from us for 1992. We'll see you again next year.
73 from Chris Edmondson, VK3CE, editor.

NEWS DESK

Readers' contributions invited

Write to GPO Box 628E, Melbourne 3001

Congratulations! And the winner is...

Our competition of two issues back, in which you were given the chance to win a new **Yaesu FT-26** two metre hand-held transceiver courtesy of **Dick Smith Electronics** and **Amateur Radio Action** has been run and won. But before we go any further, we'd better put you out of the misery now...

And the winner is:

Mr **Paul Hunter, VK2GNU**, of Glebe, NSW, whose entry was the first drawn at random to correctly identify a number of discrepancies between the front cover and the picture of it on page three of that issue. Paul was delighted when we rang last Sunday night to tell him of his good fortune. He's had his full call for almost a year, but hasn't ever used a two metre transceiver of any kind, so he was particularly looking forward to getting the prize. As he's also a keen yachtie, he'll doubtless appreciate the wide-band receive coverage of the FT-26, as its track-tuned receiver also hears VHF marine channels with excellent sensitivity.

Congratulations, Paul. You should have received your great prize by now, and we hope you're getting a lot of enjoyment from it. And thanks to Dick Smith Electronics for the supply of this month's prize.

For your chance to win *another* Yaesu transceiver turn to the cover story on page 30 of this issue.

Now, let's see how *you* fared picking up all the changes...

1. Line at top of page (BONUS! STEWART ELECTRONICS CATALOGUE) printed upside down. We threw that one in just to get you started (then received a call from an irate reader who complained that '...half the magazine...' was printed upside-down!).
2. Issue date 27 OCT 92 was changed to 27 OCT 02.
3. Volume 15 Number 7 became Volume 7 Number 15.
4. Price $3.50* changed to $350* (and *still* we sold it!!).
5. Main cover line (HF MOBILE — it's possible once again!) moved from one side of the cover to the other.
6. *Australian Publication* logo at bottom left-hand side of cover removed altogether.
7. *Yaesu* sign on microphone blacked out.
8. *Win! a new rig* sign on bottom right-hand corner upside-down.
9. Frequency display on transceiver changed (that was *very* hard to pick!).
10. Oscilloscope sweep on ARA logo moved to the right, dropped down and thinned out; and
11. Blue background color made darker on top half of page three picture.

Numbers 9, 10 and 11 were the *really* tricky ones to pick up, in case you were wondering.

One thing which surprised us here was that this competition attracted more entries than any competition to come before it — even the one from five or so years back when we gave away a $10,000 Icom IC-781!

Perhaps the big reader response was because you liked the whacky nature of the competition. If that's the case, that's good — because we're giving you the chance to win *another* great little Yaesu HT in *this* month's issue, and the competition is run in a similar vein, although you do have to think a bit!

As we mentioned above, this month's cover story about RCDs (residual current devices) and safety in the shack contains the details of how to win the radio, so get to it and learn while you have fun.

Remember, you have to be in it to win it!

KENWOOD

SANTA'S CHRISTMAS DX *DEAL!*

Here's a really *great* way to celebrate Christmas *and* get hold of that legendary Kenwood audio at the same time! Buy a superb **Kenwood TS-140S** 100 watt mobile or base HF transceiver and get an **MC-80** base station microphone absolutely **free**! That's a handy saving of around $100.

And that's on top of the TS-140's great standard features, which include: • 100 watts SSB/FM output on all HF amateurs bands • 31 full-featured memory channels • variable noise blanker with level control • CW full and semi break-in • built-in speech processor • plus much more!

To take advantage of this special deal, or for further information, contact **Kenwood Electronics Australia** or visit your nearest authorised dealer.

But don't delay! Stocks at this *very* special price are strictly limited!

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MC-80

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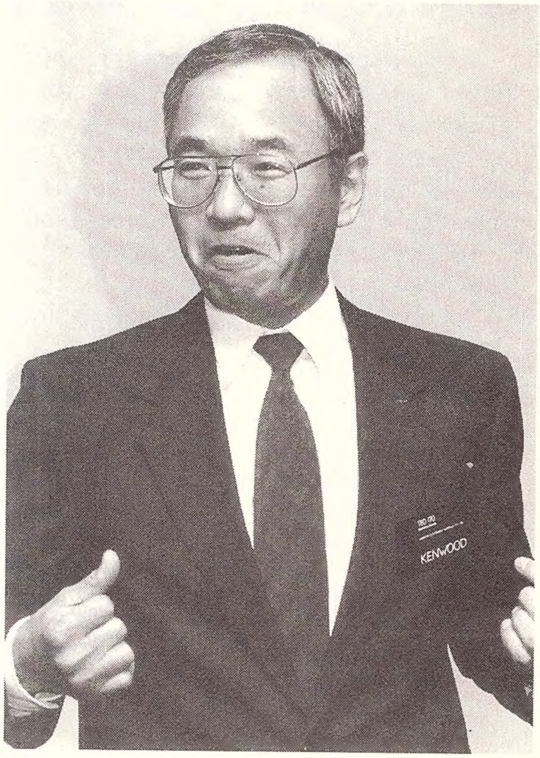
NEWS DESK

Kenwood launches new HTs…

Kenwood has fired its first shot for the 1993 model year with this month's Australian release of the **TH-78A** and **TH-28A** hand-held transceivers. At a press function held two weeks ago in Sydney, Kenwood Australia's managing director **Ted Ito** (pictured below) promised there would be some very significant releases in 1993.

The new radios feature more memory channels than ever before and a new twist to DTMF paging codes: **alphanumeric messaging**! Owners of the new radios will be able to send short (up to six characters) messages to other owners of the new Kenwood radios. That's an ideal length for a callsign, so it could be used to let the owners of other Kenwood HTs know that you've called if they missed you.



While we don't know whether many people will actually *use* the feature in this country, it's interesting to note some of the facts and figures quoted by the Kenwood people at the launch:

In Kenwood's Japanese home market, sales of hand-held transceivers outstrip those of HF rigs by a factor of four to one! In this country, by way of contrast, the market is roughly 40 per cent HTs to 60 per cent HF rigs.

The interest in the smallest rigs is, however, increasing in this part of the world, although it is not expected to ever come within a bull's roar of the interest shown by (young) JA operators. Kenwood's findings are that, while sales of its hi-fi home and car audio gear increase whether it's advertised or not, sales of amateur gear often need a prod. Perhaps the new model launches scheduled for the next few months may help to stimulate the market…

So what about the radios themselves?

The **TH-78A** was released some time ago in the Japanese home market, and it has already attracted a great deal of interest. It really is *very* small indeed — only the very new **Standard C558** is smaller and lighter — it offers the user a range of features, including **dual watch**, where the user can tune to two separate frequencies in the one band(!); a leading **50 memory channels**, with the option of expanding this to no fewer than **250 memories**! Full alphanumeric memory IDs (in other words, you can display a repeater channel with its callsign instead of the frequency if you prefer, but that halves the memory capacity) and non-volatile memories also feature, while eight scan modes and ultra-wide frequency coverage is also standard. As well as covering two metres and 70cm the receiver can tune the commercial service allocations around the amateur regions — plus 300 to 400 MHz and 800 to 945 MHz to boot! All keys are backlit, which should make things a bit easier to handle at night. At $879, this capable Kenwood isn't cheap — but all of its real opposition is also priced in this area, so we'd better get used to it. In fact, currency movements may well send the price even higher.

The **TH-28A** packs much of the FT-78A's punch, but for a recommended $549 it transmits on two metres only. In a first for a two metre HT, however, it can **receive on the 70 cm band** as well in a semi-duplex form, so it seems cross-band operation is now possible with a monoband transceiver! The TH-28A also receives in AM across 100 to 136 MHz, which makes airband listening a pleasant experience.

It's really the other side of the alphanumeric function which makes these new radios a little different, though. For some time now we've had radios which can transmit and decode DTMF codes to use in either paging modes or as a versatile receive-inhibit system. Why on earth would you want to inhibit reception, you may ask? Simple. In Japan the two metre band is now so congested that it's common for there not to be *one* available channel across the whole band (only 2MHz wide) in larger cities — and that's on a HT, which can't hear all that far away!

Japan's amateur population is now almost as great as all other amateurs in the world combined, which makes such complex signalling techniques as those offered on these new radios seems eminently sensible.

Basically, codes representing the numbers are sent in the traditional manner, with standard DTMF tones representing each number. To send letters the standard A, B, C and D of the sixteen-key DTMF keypad are used in conjunction with numerals to send all letters and numbers.

And, just like your pocket pager, these new transceivers obligingly remember the last 10 messages!

News Desk is very keen to learn whether Kenwood is going to be packaging the new radios with lessons on how to drive them…

At left, Kenwood's technical and service department head **Joe Okanoue** demonstrates code programming on the TH-28A.

WIA Exam Service…

The **WIA Exam Service** has concluded a successful first year of operation, since commencing on October 1, 1991, accrediting over 400 examiners around Australia, and providing over 3000 individual exams for nearly 2000 candidates in total.

These results are particularly good when you consider that for the first three months examinations were also being run under the previous system.

Here are the WIA Exam Sertvice's performance figures to the end of its first year to September 30, 1992:

Accredited examiners registered:	410
Percentage of examiners who are WIA members:	68.05%
Examination material forwarded for:	413 exam events
Exam Events completed:	395
Total number of candidates:	1873
Total number of individual exams:	3202
Average candidates per Exam Event:	4.74
Average individual exams per candidate:	1.71
Average pass rate:	51.44%

It interesting to note that to that date, although in many cases there is a considerable time delay while the materials are in the hands of Australia Post, only one set of examination materials has failed to arrive at its destination.

1993 Call Book

WIA divisional offices and technical book outlets should by now have adequate stocks of the 1993 Australian Radio Amateur Call Book. This edition contains over 40 pages of reference material and information about band plans, repeaters, distance records and contests, DXCC countries and accredited examiners, as well as the listing of over 18,000 Australian callsigns. This year it uses a clearer typeface than some previous editions. Be sure to get your copy early while stocks are plentiful.

***News Desk** thanks the WIA Federal Office for the last two items.*

ROD IRVING ELECTRONICS ROD IRVING ELECTRONICS ROD IRVING ELECTRONICS ROD IRVING ELECTRONICS ROD IRVING ELECTRONICS ROD IRVING ELECTRONICS ROD IRVING ELECTRONICS

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5 1/4" DS/HD	$22.95	$21.95

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Sorry, but we goofed…

Last month our worst dreams came true when a small, innocent-looking typesetting computer at our film-production bureau managed to garble a simple computer instruction which said *put italic text here*. The printer font for that particular typeface was out to lunch at the time (actually, it was corrupted beyond use), and the editor was left with a lot of egg on his very red face and a lot of explaining to do! Most of the garbled text was able to be deciphered — but not all of it, which is why we've lifted the Crossword puzzle this month to fill in a few unintentional spaces of our own…

The SEANET story was the first victim, with all of the picture captions pretty hard to read. But the FT-26 account on page 16 was a total and unmitigated disaster, with several paragraphs of italic text badly garbled.

So, for those of you who wondered enough to ask about it, here is the text you couldn't make out:

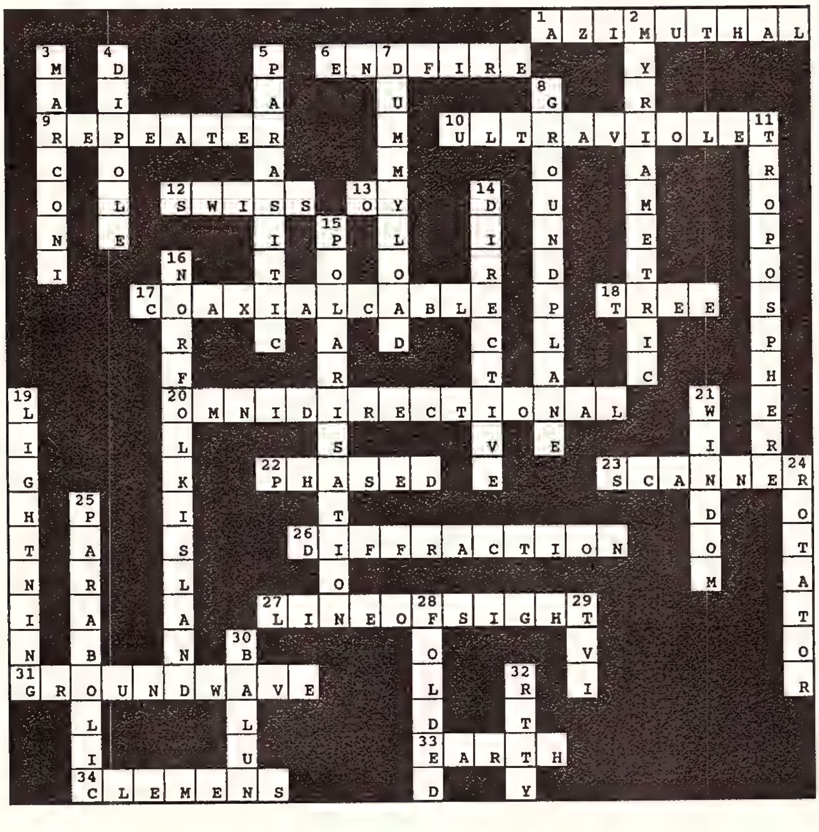
Tom says: "*…I'm happy to report that its performance is now pretty much as would be expected (of a radio in this class). With stations on a round-table net, all around Hobart, the FT-26 could hear everyone fine. I even took it along to a special place I know where all Hobart's TV and FM transmitters on Mt Wellington can sling gobs of RF at it from a distance of around 1 1/2 km. In this environment the FT-26 was easily hearing stations 50 km away running two watts and bouncing their signals off hills.*

"*Finally I repeated the tests with the rig on the 147.25 MHz repeater. This time the FT-26 heard it easily, just like the other HTs I've tried. And, as before, the FT-26 transmitter seemed to outperform other HTs into that repeater. (I had a crop of HTs here to test at the same time.)*

"*As for running the FT-26 with a high-gain outside antenna in this area of high RF fields… well, it still exhibited occasional blocking problems. So do some other radios, of course, but still… there are others which are clean. Critics suggested it was incorrect to operate the FT-26 with an antenna other that its rubber duckie, but the instruction manual itself recommends '…or another antenna designed to provide 50Ω impedance on the two metre band…'.*

"*As I said in my original article, I live in an RF sewer; my problem is particularly bad. But there could be problems for others in inner city areas. If you intend to use any HT with an outside antenna, such as for a Novice base station, you should make every attempt to try before you buy. With Yaesu gear, Dick Smith is usually very good in this regard.*"

SOLUTION TO LAST MONTH'S CROSSWORD



MASTERING THE MORSE CODE

On-air CW for newcomers

sorting out those abbreviations...

By Neil Duncan, VK3ND
Heathmont, Victoria

Actually learning the characters of the Morse Code brings you only part of the way toward getting to air with it. Whether you like the code or not, or love it or even hate it, learning enough to actually *use* it also involves wading through piles of jargon, Morse-speak and peculiar abbreviations. If you *really* want to learn the code, you'll have to learn this part too... Neil says it comes automatically, and maybe it does — after all, quite a few operators use Morse abbreviations in everyday speech!

So who better to explain this sub-culture than a devoted Morse nut? Over to you, Neil...

It seems to me that there are three stages to getting serious about Morse Code and actually running contacts with others using it on the air on Amateur radio. The first two stages pre-date your transmitting licence — memorising the various characters (starting with E perhaps!) and then later convincing the appropriate examiner that you can send and receive CW at a suitable speed to warrant a licence for the HF bands. The *third* stage, though, is the tough one — actually getting on the air with this mode.

So let's focus on this third stage, as it's rarely spoken of and, sadly for many, the direct result is that CW is often dropped before actually achieving this stage.

To my mind, Morse Code provides us with an almost international language, while CW has the ability to get through when other modes won't. Because of this, Morse Code via CW attracts the REAL enthusiast.

One major problem for the would-be user comes at the start, when CW seems incomprehensibly different 'on air' compared with the simplicity of the plain text learned in the first two stages. Why should this be? What are the secret rites of the privileged elite 'down the bottom end of the band'? Let's investigate...

Decoding CW

If you hook up one of those new-fangled multi-mode decoders to the output of your receiver, you will find that commercial CW (hopefully not found in the amateur bands!) is usually fully able to be decoded as text. It reads just as if it were dictated from a newspaper. Indeed you can still find news services and all *kinds* of things in plain CW.

Tune in to an amateur CW contact however, and things seem a little different... These days, most amateur radio CW signals are crystal clear and very clean in their spectral purity. Once in a while, some signals will sound chirpy or click away in a terrible style. Some even sound like a series of bubbles bursting (unregulated power supplies do *wondrous* things!). Ecch. That is not the point here — most signals are very each to tune in indeed so I submit that it is not this which dissuades some from using the mode.

Perhaps it is the variation in the CW sending *style* which should be in question. Those signals which have been generated by a computer and keyboard are easily picked out. They sound lovely and, although I reckon they are completely devoid of personality, they impart the best CW — provided they don't go too fast for those of us without decoding boxes. Then, of course, there are the signals *WITH* personality.

Sending devices

For a start, amateurs use three different mechanisms to send their 'manual' CW. The hand key is often associated with signals using wrong dot/dash/space ratios. Very long dashes and short dots (or the reverse) are often heard here as a result of the hand key. Sometimes the spacing between characters and words will be illogical. While old timers will actually love this musical aspect, the computer-based receiving devices I have mentioned tolerate no poetry or music in their CW at all.

If the spacing or length is wrong anywhere, they WILL NOT correctly display the message in the mind of the sender on the computer screen. Indeed, it is a humbling experience to send CW yourself directly into one of these decoding boxes (off air) with a hand key to see if you can deliberately say something sensible on the screen!

They say that, in World War II, it was essential to rotate one's CW operators through a roster. Apparently the enemy easily recognised the exact operator if manually-sent CW was used. Each of us develops his or her own style and that becomes a giveaway which was quite intolerable when greater secrecy was warranted.

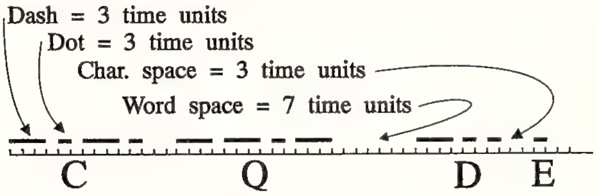
The second manual sending mechanism is the semi-automatic key. This is a mechanical device which sends a series of dots if pressed on one side and a continuous dash if pressed on the other. Mechanically, it is based on the principle of a hacksaw blade which goes 'doiiing' if flipped a bit. CW sent on these devices sounds quite good — but again tends to encourage accentuated dash lengths and timing and spacing can be a problem. Computer-based decoders will still have trouble listening to these devices.

The third mechanism is the fully automatic keyer and paddle combination. Many modern rigs have electronic keyers built into them and all you need to add is your own keying paddle. The CW sent from this combination is almost machine-like but spacing, bless its heart, is a problem still and you can still detect echoes of personality in their output!

Spacing

I have emphasised the spacing of CW characters and words. Consider the length of a dot as occupying one unit of time. The space between dots, dashes or dots and dashes should occupy the same amount of time. Should you be lucky enough to be able to count the number of dots per second in a given transmission speed, multiply by 2.4 and you will have the speed of the transmitted CW in WPM.

The length of a dash should be three times the dot length. Between characters, there should be a space equivalent in duration to three dots and, between words, seven dots. Listen on the air and you will hear severe abuse of these conventions where hand CW is sent!



The jargon

Let's progress into CW which is received 100 per cent correctly—that is, signals whose text (as sent by the typical CW station) would be decoded perfectly by a decoding device. Thus, we will ignore the problems associated with error, spacing, timing, or other generally bad CW errors which we've already mentioned. In addition, let's assume that we are listening with trained ears or that we are 'cheating' and making use of a computer decoding device. The station we are listening to is to a well-experienced CW operator somewhere on the HF bands. What is being sent and what are the rules?

If you actually try this, you'll realise that what is clearly the most important part of the text is made up of a seemingly endless list of jargon words. Now, most of these words are designed to be shortcuts in the sense that they are abbreviations of words or phrases. **CUAGN**, for example, stands for 'see you again'. Others simply cut down on the number of dots and dashes to be sent. **ES** (derived from the French language) stands for AND while **FER** stands for FOR.

As I see it, there are two main points to this system of jargon — the ability to shorten the time it takes to send the stuff but also the ability to communicate with others whose English is very weak (try working VK7TM, for example!).

It would certainly pay you to memorise a full list of this vocabulary of words and phrases if you intend to take CW QSOs up. The list given below contains 'survival' abbreviations in the sense that they are used so often. Yes I *know* Q codes are to be memorised for other reasons, but I have included some essential ones for those who may not have their amateur licence yet. Sadly, some of these abbreviations are also used on voice modes. Actually *saying* XYL rather than 'wife' or QRX rather than 'hang on' annoys me intensely. I wonder if such people say those and others unnecessary things at parties?

Anyway, take a look at these:

5NN	5 by nine by nine (signal report)
73	best wishes
ABT	about
AGN	again
ANT	antenna
BCNU	be seeing you
BK	break
CUAGN	see you again
CUL	see you later
DE	this is (VK3CE de VK3ND)
DR	there (fine there, Neil,..)
ES	and
FB	fine business ("okay about...")
FER	for
GB	Goodbye
GLD	Glad
GUD	Good
HEE	See Hi
HI	Laughter
HPE	hope
HR	here
K	over to you (VK3CE de VK3ND K)
KN	over to you and no-one else (VK3CE de VK3ND KN)
MNI	many
NR	near
NW	Now
OM	husband, 'old man' or 'you'
PSE	please
PWR	power
QBB	stick it up your bum
QRT	quitting, going off air
QRX	hang on a jiffy
QSO	an on-air contact
QTH	location
RPT	report
RR	roger, roger
RX	receiver
SIG	signal
SK	over and out
SN	soon
TCVR	transceiver
TNX	thanks
TU	thank you
TX	transmitter
U	you
UR	your
VY	very
WK	work (to contact someone)
WX	weather
XYL	ex-YL; wife, usually
YL	young lady

Undoubtedly there are more CW abbreviations but they will become obvious as you warm up to the idea and listen around a bit. Most are just sensible shortenings of words and sentences. Perhaps we could illustrate with a couple of example QSO overs.

1. Normal text: 'Thanks for the information old man and I am very glad to work you for the first time. My transceiver runs 100 watts and the antenna is a dipole. The location here is near Melbourne.'

CW abbreviations applied: 'Tnx fer the info OM es vy glad to wk u fer the first time. My tx runs 100 watts es the ant is a dipole. QTH hr is nr Melbourne.'

2. Normal text: 'Thank you for the very nice report on the signal. I intend to shut down now. The weather is good and I have many things to do outside. I hope to see you again, best wishes. VK3CE, this is VK3ND concluding.'

CW abbreviations applied: 'Tnx fer the FB rpt on the sig. I will QRT nw. The WX is vy gud es I have mni things to do outside. Hpe to CUAGN 73 VK3CE de VK3ND SK'.

(As received by VK3CE: 'Tnz ...... sig. Beep beep BXYZ POO. QBB'. Oh well. Ed.)

Coping with noise

Another, quite different, situation arises when you have to cope with interfering signals and noise on the bands. Probably the best conditions for a novice to start out with would be using a receiver in wideband mode, tuned in to a deadly quiet band with respect to QRN, and then to locate an excellent S9 signal with no nearby, interfering signals. But remove any one of those special conditions and things alter.

A narrow receiver bandwidth is one matter some beginners will not easily contend with. Consider listening to a very weak signal on a crowded and noisy band. For *any*one this means poor copy. Now switch in a narrow receiving filter and tune in that weak signal — it suddenly becomes feasible to copy what is being sent — despite noise and QRM on the band.

Now, the effect of a narrow bandwidth can take some time to get used to. The muffled tones and the ringing effects are difficult at first. There are those who would say "my ears must be different to everyone else's — I cannot cope with the muffled tone. I like lots of treble." Rubbish. That is a matter of discipline, learning and patience.

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A bloke I met the other day has earned a FIVE band DXCC using CW. He is a wizard at narrow-band CW techniques. He tuned into some stations at the lower end of 40 metres when I was there — they were ultra weak and were signing with strange African prefixes. These were signals which I would have passed over. Certainly, only a narrow filter will pick it up and a set of headphones certainly helps. Needless to say, he worked a couple while I was there (using 100 watts).

The *ARRL Handbook* has an excellent section on the mathematics of CW bandwidth and rise and fall times of the CW waveshape. They reckon a 50 millisecond rise and fall time is optimum, for example. Why do I mention this? The narrowest CW filters play havoc with these concepts, and the 'ringing' effect you hear as a consequence is quite disconcerting. In fact, when a narrow filter is switched in the copy on a CW decoding box will quite often be degraded. Maybe there is something to be said for the human ear after all!

Have a go

The point being made here is to at least attempt on-air CW. At first it may seem difficult in that lots of receiving practice is necessary. The CW decoding devices are only partially successful for the variety of reasons I have mentioned. In their more practical use, you still need to decode by ear what is going on to make sense of a typical QSO.

The rules

Start by keeping a few basic rules in mind:

- **Don't sent too fast** and the other station won't either. Remember, sending is the easy bit.
- **Listen a lot** and get the idea of just how a normal QSO is conducted. Personally I love the mode, the clear guidelines obeyed by seemingly everyone and the constant challenge of getting the most out of the bands especially when the other modes are having trouble getting through.
- Look down at the very **bottom end of the bands** for the best CW activity. These lower portions are allocated exclusively to CW and, despite incursions of digital modes higher in these segments, the closer you get to the lower band edge, the more activity goes on.
- Be sure of your rig's **frequency calibration** and of the **'sideband'** you are transmitting (or more precisely, the true transmit frequency given a specified receive frequency) before you get too close to the band-edge though.

The really hot, slick CW operators tend to congregate at the very lowest lower band-edges, so be sure to have a little practice before firing up in their stamping grounds. Remember, these operators can fit a whole lot of simultaneous QSOs in the same band-space as would be used by one boring old SSB contact! Another appeal of CW is the continuous rewards for improving in the skills you need. One thing is for sure — you reap the rewards of practice.

If the band is dead, no-one bothers with SSB, packet or RTTY for anything else but local contacts. No-one, that is, except the CW operators. It constantly amazes me just how many CW QSOs both local and DX are going on at such times — let alone during peak times!

Join the devotees of the king of modes — but be prepared to earn your proficiency badge first!

DXPEDITION REPORT

On a Wing and a Prayer

DXpedition to Willis Island 1992

Words and pictures by Jim Smith, VK9NS
Norfolk Island, South Pacific

(Note: all picture captions for this story appear on page 19.)

The DXpedition to **Willis Island** in October 1992 *almost* did not happen. Originally the H I DX A plans were for a DXpedition to **Mellish Reef** using a chartered vessel as a means of transport. It was then intended to call in at Willis Island for a couple of days, subject to permission being given.

As things turned out, a decision was made to try for Willis Island alone, and a start was made on this project. Willis Island is a tiny speck of Australia lying off the coast of Queensland. It has a basic role of being a weather station under the jurisdiction of the **Bureau of Meteorology**.

The island is manned continually, on a rotating six-monthly stint by a small team. The station gathers weather information on a daily basis, thus supplying valuable information to the mainland. It surprised me when I discovered that Willis Island has a long history in meteorology — stretching back to the early 1920s. In those days the island was often manned by just a couple of people... a lonely sort of existence.

The Queensland Regional Office of the Bureau of Meteorology was kind enough to give our small party of three permission to visit the island for a period of seven days. Our small group was to almost double the population of the island overnight!

pic 1

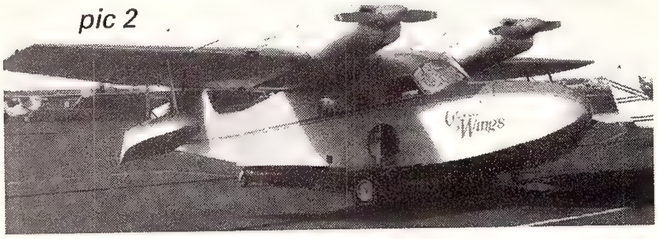
With this important permission in place a move could be made to firm up our plans. When HIDXA first started on the Mellish/Willis Island trail, **Bill VK4CRR** did a lot of leg work. At one time he had received some input about the possibility of flying to Mellish Reef but this fell through. The flying distance there and back was too great. It was this idea which I followed up later as a possibility for Willis Island since it is much nearer.

However the idea almost stalled. Due to the total flying distance over open water, the necessary CAA dispensation could not be given for a single-engined float plane. (This might be a good time to let you, the reader, know that Willis Island is just 12 acres of real estate and a few metres above sea level, having neither strip nor runway.)

However, our contact point in Queensland also did some leg work. He came up with the possibility of a freelance pilot, a twin-engined Grumman 'Super Widgeon', amphibious float-plane (yes I realise that is going back a bit!). What sealed the idea was that the pilot was available for a charter and CAA clearance could be given for the flight.

The Grumman 'Super Widgeon' is a relic of the late 1940s and I use the word relic in the kindest possible way. 'Coral Wings', registration VH-WET (how appropriate!) proved to be ideal for our plans.

pic 2

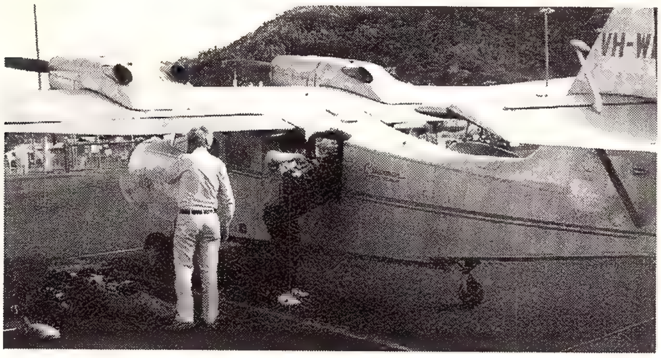


With DoTC licensing as VK9WW in place, agreement on the charter costs for the plane and the final clearance from the Bureau of Meteorology, things really began to move. There was a false start due to a change in the dates on which the pilot could be available but this soon firmed up to October 12. The actual departure was of course subject to weather conditions but things looked good. The three members of the group became **Atsu, VK2BEX**; **Kirsti, VK9NL** and myself... and our total weight was 210 kg.

The manifest...

Weight became an all-important part of our plans. The plane could not refuel at Willis Island and, as a result, we had a severe weight restriction. Atsu and I had many telephone discussions and fax exchanges over equipment, relative weights and so on. We came up with three complete stations: one barefoot IC-751, one IC-750AS (the JA IC-751 equivalent) with an Icom 500 watt linear, and one six metre rig with 60 watt linear.

Antennas were to be two multiband verticals, a Cushcraft R5 and Butternut HF6V, plus a 5-element beam for six. RTTY operation was to be by means of a lap-top computer



and terminal unit. In addition microphones, keys, many metres of coaxial cable, wire and so on, slowly ate into our weight limitation. I know Atsu and I weighed and re-weighed rigs etc on several occasions. Great care was taken to avoid any unnecessary items. Atsu went on a diet, losing over five kg in a couple of weeks, so we were able to take log books along.

We arranged to meet in Cairns, our departure point, on Sunday October 11. It did not give a lot of time, but we felt that it should be long enough. For our shopping requirements most of the shops were open on Sunday. Atsu brought all his equipment into our hotel room and a further check was made. Initially things looked very tight in the weight department. I then called the pilot on the telephone and we discussed our plan of action prior to leaving. As a result of our discussion it was then suggested that we could load the plane right away. This now meant that we could shed a lot of weight and certainly make a much easier start in the morning, prior to our departure.

John, the pilot/owner, came over with a highly-accurate weighing device known as 'a pair of bathroom scales' and a start was made to finalising our total weight. With the easy loading of the plane, it was apparent that much saving could be made in shedding outer wrappings like suitcases and so on. For example, each suitcase weighed about five or six kg.

So it was that items were unpacked from suitcases etc, to become single-wrapped items, such as an Icom IC-751 wrapped in a towel. As we checked the weight of the equipment items (once again) they formed a heap to one side. John kept a running tally on these weights, finally adding the weight of the three passengers to arrive at the total.

Suddenly we were home and dry over the weight problem. I believe we shed over 40 kg of surplus weight. A drive to the airport with all our items and an hour or so later everything was on board 'Coral Wings' ready for the next morning. We heaved a sigh of relief — we could now relax.

pic 5

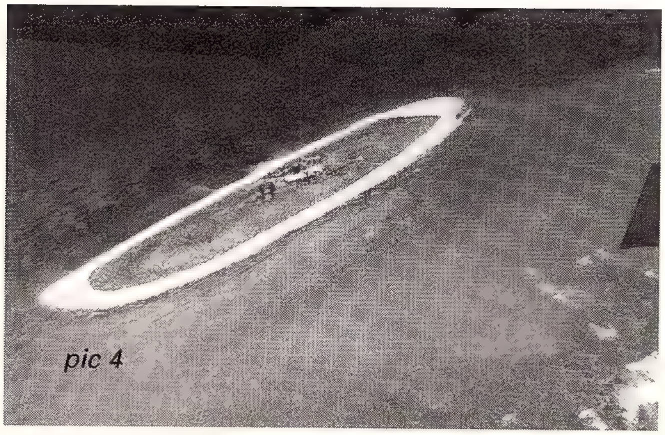
The three of us returned to the hotel room which looked as though a bomb had hit it. However, we soon tidied up and the hotel was kind enough to store our suitcases and unwanted packaging ready for our return.

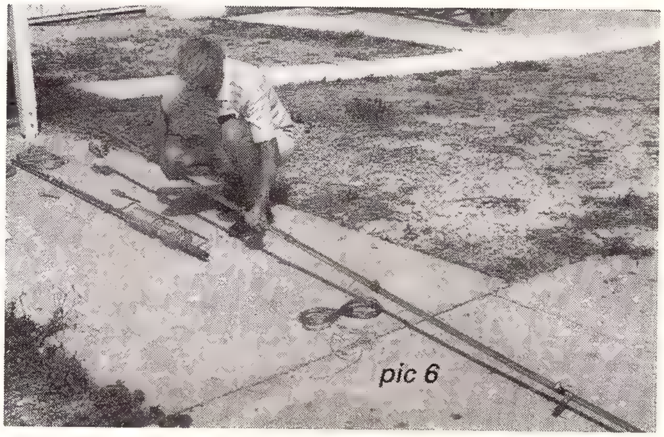
We met up with **Harry, VK2BJL** (now VK2RQ) and his wife Mary. Harry and I are old friends as we had been to Tokelau on DXpedition in 1982. They took good care of us in Cairns and we shared a pleasant evening in a local club. Harry arranged to pick us up early next morning and take us to the airport. Of course we still had a lot of shopping to do.

Sure enough Harry was at the hotel bright and early next morning and we headed for the airport via the supermarket. Every item purchased was weighed by the checkout girl. However, with the weight saved from the efforts of Sunday, our shopping became very straightforward and with a couple of minor exceptions managed to get everything required. We did make a couple of sacrifices at the checkout counter, 6 kg of bananas instead of 12 kg, and so on. Since the plane would fly empty to pick us up, we had made arrangements to have the pilot bring several things to Willis Island on that leg.

Our departure point was the international terminal at Cairns since there was a requirement that we cleared Australian Customs. This clearance was very straightforward and, of course, we were carrying almost 60 kg of various items including those purchased at the supermarket.

'Coral Wings' looked tiny and was parked just a few metres away from a Qantas jumbo jet. We soon finished our final loading and we were all aboard. The Grumman 'Super Widgeon', being amphibious, is fitted with an undercarriage and soon we were taxiing ready for take-off. It was about 10:30 in the morning and we were running about one hour later than planned... not bad!


pic 4


pic 6

pic 7

pic 9

Flying over Cairns only took a few minutes and then we were heading out to sea, climbing steadily, on course for Willis Island some two hours flying time away. We soon reached our cruising height of just over 2,000 metres and flying jump seat reminded me of Papua New Guinea — in those days I had flown thousands of km in small aircraft. None of us have any doubt that we 'flew' to Willis Island and back again. Our intimate contact with this plane for every inch of the way remains with us, for we flew by the seat of our pants. Flying many miles over open water in any small plane is a sobering experience, not like those jumbo flights at all.

With a satellite navigator on board (a recent purchase by the owner/pilot) Willis Island would be easy to find. However, the pilot later made an interesting comment saying that the island was about two miles 'off course' according to the current charts. If correct, this is an interesting discrepancy, especially if arriving by sea!

Just as we started our descent for Willis Island the sea started to roughen up. Until this point it had been very smooth and calm. Soon Willis Island was ahead looking very tiny — and first impressions are lasting. We were now on approach for landing and the sea swell looked quite heavy. The landing was very bumpy, but after three hefty bounces, lots of water on the windscreen (and presumably elsewhere) we were taxiing towards shore. (Kirsti reckons that on landing she did not have time to scream!!!)

The welcoming party of the current four island residents was on the beach to meet us. They gradually became life size as we taxied through the opening in the reef. Incidentally we taxied with the undercarriage down — it's better to hit a reef with the wheels than the hull! A good idea, I thought. John was able to put 'Coral Wings' right up onto the beach. He wanted a fast turnaround before the weather got any rougher.

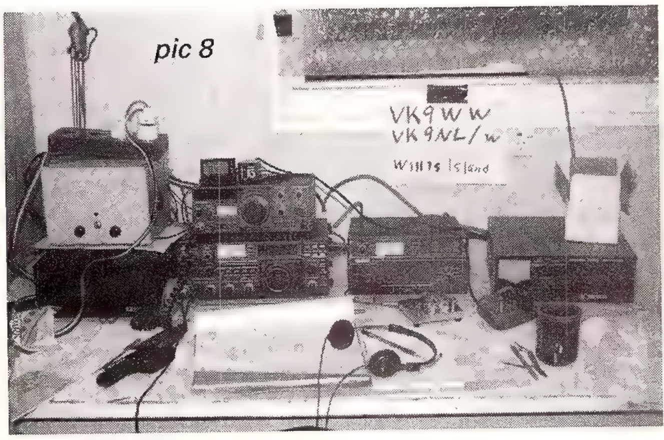
There was a mad scramble to get everything off the plane and heaped on the oh-so-white beach. As we unloaded we all made a hurried introduction to each other. John, the pilot, topped up his tanks from the jerry cans he carried and before long he was ready to be on his way. After take off 'Coral Wings' circled the island and set course for Cairns. It had all taken just a few minutes, and standing on the beach we all looked at each other.

Willis Island we have arrived!

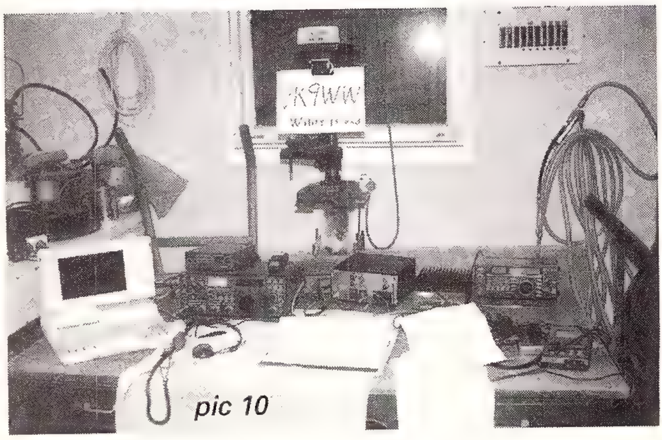
Setting up...

By the time we had moved everything up off the beach to the base area, it was getting quite windy. In fact, a couple of hours later a landing would have been impossible and this gusty weather was around for several days.

The OIC suggested that we set up our stations in the workshop area, and this suggestion was welcomed by the three of us. In due course the two HF rigs were set up, and



pic 8



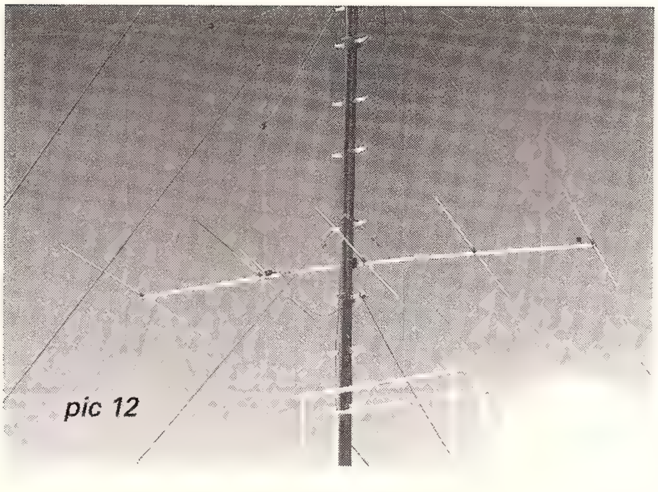
pic 10

the two verticals assembled and connected. So it was that within a couple of hours of arrival **VK9WW** and Kirsti, **VK9NL/portable Willis** were up and running. There were still things to do: the six metre antenna, wire antennas and so on still to be completed, but we were active. The amateur radio grapevine would soon spread the word "...Willis Island is on the air!".

Like all DXpeditions once they are up and running things become hazy. It becomes a battle of one's own stamina against the endless pile-ups and things move along with another antenna organised and other bands worked.

In the first day we had an early opening on six which was followed by a couple of days of complete silence. On a suspicion that things were not okay the antenna was brought down. This brand new antenna had a faulty connection in the gamma match. This was fixed and at least there was confidence that if the six metre band opened again at least we would know. Atsu chipped away at the pile-ups and then VK9WW also became available on RTTY. Meanwhile, Kirsti and I shared the other station, each operating as long as we could, then changing over. It became days of operating, catching a few hours sleep and another swap of operators. It worked out very well.

The workshop operating area was quite noisy, but since it was air-conditioned it was a real bonus for us, allowing us to operate with little real fatigue. As the QSO totals crept up, after a few days we knew that the DXpedition was beginning to look okay. Still, you know what they say... "...never count one's chickens..." and "don't get overconfident" and the like and, sure enough, the Icom IC-750AS quit. No transmit on any band or any mode. It took me some time to get to the problem but finally we were back on the air again. Murphy had been defeated once again.



pic 12

Of course, the daily life and work of the island went on. To avoid any possible interference problems we shut down during the daily morning weather observations which started with the launching of the weather balloon. As it headed for the atmosphere it would then be tracked by radar until it burst. Shortly after we would get the okay and it would be back to the pile-up.

As time and band conditions permitted each of us in turn toured the small island looking at the countless sea birds which call Willis Island home. We all have our share of close-up bird photographs of boobies, frigate birds etc. We also saw signs on the beach of turtles having come ashore, and on one occasion one was swimming just a few metres off shore.

We also began to learn more about our hosts, and in joining them once a day for a meal at least we kept in touch.

pic 13

However, as things turned out propagation was not too bad and there was almost always a band open. Our operation became more or less around the clock closing when the bands finally closed. There were good openings to most areas during our stay.

The small meteorology group on Willis Island have very good facilities for their living and recreation time, a well-stocked library and more. Also, with these days of satellite TV the island is not quite as isolated as in days gone by. They were very hospitable and I suppose our arrival brought some measure of change to the normal daily routines. During one of the morning sessions a VK station called me and mentioned that he had been on Willis Island many years ago.

I asked his name then asked him to hang on while I quickly checked the Roll Board which carries the year and names of all previous staff members. Sure enough his name was there — but in the same year so too was the name of the present OIC! So it was that a few minutes were taken from the pile-up while they caught up with life since they had last worked together on Willis Island.

Homeward bound...

Finally it was time to get ready to go. We were due to be picked up at about 0900 on the Monday morning — we would have spent seven days, less a couple of hours, on

Willis Island. With some 18,000 QSOs in our collective logs things had gone very well. Starting quite early in the morning we gradually prepared for pick-up, taking down antennas, rolling up coaxial cable and so on. About one hour prior to our projected pick-up we closed down and VK9WW and VK9NL/W went silent.

As we tidied up the workshop, after our packing was more or less finished, we were left with those moments after all DXpeditions — the beginning of the switch-off, a return to normality. The relaxation which comes about in the knowledge that things have gone well and one can begin to wind down.

Soon all our gear, nicely gift-wrapped again, was back on the beach. Had it *really* been a week since we arrived? It seemed more like a couple of hours! Shortly after, we heard 'Coral Wings' approaching and within a few minutes John was taxiing against the beach once again.

This time, free of weight restrictions, John had brought a few goodies for the group, courtesy of H I DX A. The plane was unloaded quickly and John completed his tank topping-up exercise. We soon had all our gear on board and, with a final cheerio to our hosts, we boarded the plane. We were on our way, and this time the weather was fine and the take off easy. Once again we were in the air looking down at Willis Island. This time we knew every bit of the island and as we got a little higher we saw the other islands of the Willis Group in the distance. They are not visible from Willis Island as they lie just over their horizon.

pic 15

The two hour trip back to Cairns was uneventful, and soon we were on approach to Cairns airport ready for landing. Shortly after John got customs clearance for us and we could then proceed direct to the 'small aircraft' terminal. This mean very easy unloading and I was soon telephoning for a taxi. After saying goodbye to John we headed back to the hotel and checked in.

The Willis Island DXpedition had finished. Like all true DXpeditioners, a couple of hours later, Atsu was already starting to enter his part of the VK9WW log into the computer log. This is called dedication!

Our Willis Island QSL card carries acknowledgment and sincere thanks to the many who helped make this operation successful. Atsu proved himself to be a real asset to our small team, and carried a large share of the operating during our DXpedition. Thanks must also go to Kirsti for her dedication to the exercise and her activity giving many a new YL country.

pic 16

To our four friends on Willis Island a *big* thanks, and we trust that we, as radio amateurs, brought some cheer to your lonely spell on this tiny island.

Many thanks.

73 from Jim Smith, VK9NS.

PHOTO CAPTIONS

1. *Repacking gear in hotel room.*
2. *'Coral Wings', Grumman Super Widgeon, VH-WET.*
3. *Loading Coral Wings... will we get all the gear in?*
4. *Arrival overhead the island.*
5. *Welcoming committee — the gang of four.*
6. *Jim assembling the HF6V shortly after arrival.*
7. *HF6V all ready to go.*
8. *VK9WW and VK9NL/W operating position — Icom IC-750AS/Icom IC-2kl linear/antenna tuner.*
9. *Kirsti operating VK9NL/W*
10. *VK9WW operating position by Atsu — Icom IC-751/ Icom six metre rig/six metre amplifier/laptop and RTTY terminal.*
11. *Atsu operating RTTY.*
12. *5-el six metre beam — red matching box had a faulty connection.*
13. *Our hosts — the met team on Willis Island.*
14. *Atsu and Jim loading up ready to leave.*
15. *Jim and Kirsti just before leaving Willis.*
16. *Coral Wings arrives for the pick-up.*

pic 14

EQUIPMENT REVIEW

Standard's latest hand-held: the C558

Two big bands in one little box

By Tom Moffat, VK7TM
Fern Tree, Tasmania

Standard's radios have been around for years, but many of you would not be familiar with the brand. Most of its amateur products are VHF and UHF hand-held transceivers, and most of these are viewed with nothing less than affection by their owners. We sent the latest to Tom.

Standard's new twin-band hand-held radio appears to be a major upgrade on its earlier C528, a capable twin-bander which we reviewed quite positively in late 1990. The new radio seems to share a lot performance-wise with the earlier version, but its operation has been dramatically altered with lots of new features — and it's been dramatically shrunk at the same time. Some of these new features appear quite useful, while others seem to be there simply because other radios have them and it didn't cost much to put them in.

I remember when the first twin-banders came out — Yaesu had one, and so did Icom. They were big and boxy; almost the largest size you could comfortably hold in one hand. But they were great because you had VHF and UHF in the same radio. Then they got smaller and smaller until the current twin-banders became the same size and weight as a single-band rig of just a couple of years ago.

Perhaps at this stage we should again differentiate between *dual*-bander and *twin*-bander radios, in case the distinction is unclear:

A dual-band radio covers both VHF and UHF, but much of the circuitry is shared between the two bands. The receivers, for instance, may have separate front ends, but they might share the same IF and audio sections, and volume and squelch controls. You can receive on VHF or UHF, but not on both at once.

A radio of this type is my own Icom IC-24AT. You can assign VHF or UHF channels to its memories and then switch or scan through them. Both bands are treated the same way and eventually you don't notice whether the signal you hear is on VHF or UHF. This is a very simple kind of two-band operation which I have grown used to.

A twin-bander, on the other hand, has circuitry duplicated pretty well right down the line for both VHF and UHF. There are virtually two completely-separate receivers, each with its own volume and squelch control, bank of memory channels, and frequency and status display. The only things shared are the antenna, the battery, and the speaker. Some twin-banders even have two external speaker connections so you can have VHF signals coming from one speaker and UHF from the other, or one band in an earphone and the other on the internal or external speaker.

You can transmit on UHF while the VHF section is still receiving, too; this is full-duplex operation (some dual-banders such as the IC-24AT allow this too). If the receive audio from the speaker makes it into the nearby microphone, it is re-transmitted from UHF to VHF or vice versa. If a simple audio connection from receiver output to microphone is provided, we have a cross-band repeater.

Such operation is not presently legal in Australia, and although Standard's C558 manual says the radio has the feature, it appears to be disabled in the current model. There is also a way to kill the speaker audio while the transmit button is depressed, removing any chance of accidentally repeating incoming signals such as Novice licensees onto the UHF band.

But we're getting ahead of ourselves... let's look closely at the Standard C558, starting from the outside.

First impressions...

The radio is black — matte black — it's almost the same color as a lump of coal, and it's slightly rough to the touch in a pleasing sort of way. I don't think this is an accident; the rough surface of the case means there's little possibility of it slipping through your hand. The matte black case is set off by a glossy black finish for the LCD display 'window frame' and the knobs and some of the buttons. The remainder of the buttons are grey.

The display occupies nearly the full width of the radio, and it *needs* to be since it is showing the operation parameters for two completely-independent radios. So the display is a bit crowded, and when you are using memory mode on both bands you see something which looks like '**03146700046822**' in two different-sized numerals.

This tells us that the VHF section is on Channel 3 which contains 146.700 MHz, and the UHF section is on Channel 0 which contains 468.225 MHz. (The final '5' won't fit in that string so it appears as a tiny numeral just above the second '2'.) There are other small 'annunciators' and bar-graph S-meters above and below the main digits, and meaningful dots between them. It's a very busy display indeed and it's just a little hard to read sometimes. (Younger readers or those with good close-range eyesight should have no trouble in average light.)

Below the display is the keypad, made up entirely of small round buttons. But these are of two different types. The buttons used for major commands such as **CALL**, **VHF/UHF**, and **MEMORY/VFO** are slightly larger than the rest; they're shiny black plastic, and they reside in the ends of small trenches instead of round holes. The buttons associated with the DTMF pad are slightly smaller than the black ones, they're grey, and they feel rubbery. The two buttons for **LAMP** and **MONITOR** sit off on their own, near the PTT switch; they're smaller again, grey, rubbery, and in the center of trenches.

This arrangement may sound a bit weird, but I'm sure its purpose is to allow the operation of the radio by feel alone, in total darkness or by a visually-handicapped amateur.

It wouldn't be all that hard to memorise the functions of all the buttons — LAMP and MONITOR should be easy enough, every DTMF pad (and telephone dial) has the same layout, so that leaves just the five command buttons to memorise.

You would soon learn that the middle smooth button in the left row, at one end of a trench, is the button to select VHF or UHF for transmitting. You can set in new frequencies with the familiar numbers on the DTMF pad, the buttons with the rubbery feel. The radio confirms these commands with suitable beeps and boops if that takes your fancy. If not, you turn them off.

It's good that you can work these buttons by feel, because their labels leave something to be desired. Main functions and DTMF numbers are in white — good enough. But secondary functions are in blue against that coal-black background, and they are *very* hard to read in any but the best light. The red markers for **A-B-C-D-*-#** are just as bad.

The C558's designers applied some of the labels in an odd but attractive way. It's as if they drew a grid of lines on the front panel sloping 45 degrees from lower left to upper right, and then wrote all the secondary labels along these lines. It adds a touch of sparkle to what would otherwise be a fairly ordinary-looking radio.

The top of the C558 is adorned with individual squelch/volume control combinations for UHF and VHF. The squelch controls are calibrated with numbers 1 through 10. The VHF controls, and the VHF display, are always on the left, and those for UHF are always on the right. This is in direct contrast with the screwball scheme used by some other manufacturers where the 'MAIN' band which is selected for transmitting is on the left and the 'SUB' band, the alternate band receiver, is on the right. I prefer my bands to stay put, thank you very much, and Standard is to be commended for fastening them down properly.

Behind the volume and squelch controls are the tuning knob on the right, the antenna on the left, and rubber-covered mic and speaker connections in the middle. And in the right front corner is the on-off switch, a simple button which obviously toggles a software control somewhere.

There are two disadvantages to this on/off switch: One, if the battery goes completely flat, or if the microprocessor crashes, the software will no longer work so there will probably be no way to turn the radio off other than to remove the battery. I've seen it happen with similar radios. Second, the radio must be using some battery power to monitor the state of this button, so it is never truly 'off'.

The laptop computer I'm using to write this review is much the same. When it claims to be 'off' it is keeping a lot of things simmering on the back burner inside, and if you come back after a week of it being 'off' you will find the battery dead flat. The only way to prevent this is to remove the battery.

Like many HTs today, the C558 uses the back of its case as a heatsink for the transmitter(s). It's a solid chunk of diecast aluminium which never seemed to get even remotely warm while I did some extensive transmitter testing.

Some features...

The basic version of the C558 has 40 memories, 20 for VHF and 20 for UHF. But if this isn't enough, how about ***100*** for each band? You can get a tiny optional extra plug-in module which provides a total of 200 memories. You'd have to be a pretty keen operator to use all of these, but if you're a scanner freak then you'll fill them up soon enough.

Needless to say, the radio features wide-band receiver coverage on both VHF and UHF. The performance isn't anything to jump up and down about (about on par with a dedicated scanner) but is still very useful for those of a snoopy frame of mind. Remember that out-of-band coverage is not shown in the specifications, and is therefore a 'freebie' from Standard to you.

Do not look a gift horse in the mouth. Instead consult the response versus frequency curve reproduced herein. Tests were done only on the VHF section; as my signal generator does not do UHF, but listening tests show you'll hear the coppers around 468 MHz well enough. The UHF receiver also covers the 800 MHz band.

You will notice that the VHF response curve is in two parts, with a big crash in response just below 140 MHz. The 'good' area below this represents the AM aircraft band, but I noticed that the C558, unlike other radios, did not automatically shift to AM reception as it entered the aircraft band. It kept trying to receive on FM and, since its FM detector has very good AM rejection it could only produce some weak scratchy noises on aircraft signals.

I had some appropriate rude remarks about this prepared in my notes, but I then noticed a feature under the 'SET' function which changed the VHF receiver (but not UHF) to AM. AM could thus be received (but not transmitted!) on any frequency from 110 to 174 MHz. This brought the aircraft band nicely to life, but what other use is there for AM on VHF? Well, 20 years ago there were lots of people running AM on two metres, and I understand there are still some AM repeaters in New Zealand.

Memories and scanning...

With the aircraft band operational I decided to program the local tower and air traffic control frequencies into the C558's memories. The procedure is to set the frequency you want into the VFO, press the function and ENT buttons, and then key in a two-digit channel number. But when I tried this with the VFO set to AM, the frequency went into the memory all right, but the mode reverted to FM.

I finally learned I had to put the receiver into memory mode, select the channel where the AM station was to go, *then* go to the SET mode and select AM! This seemed to have the effect of 'priming' the channel with AM, and it could then accept an AM aircraft channel from the VFO. When AM is active it replaces the first digit of the frequency display with an 'A', so that the Hobart tower frequency of 118.1 MHz displays as 'A18.100'.

Still on memories, it is possible to use each one as a tunable VFO. If, for instance, you want to snoop around the marine channels, you can select one of them you might have in memory — perhaps 156.8 MHz — and then hit the shift key. From then on you can use the tuning knob to move up and down from 156.8 MHz. Another hit of the shift key restores the memory to its original frequency. That's quite a handy feature too, although it's by no means unique.

Relative sizes... the Standard C558 at left is a lot smaller than the Icom IC-W2A at far right, although the Icom shown here has a larger battery than standard. Anyone recognise the rig in the middle?

The C558 supports several useful scanning modes, and with the addition of that 200 channel memory module it would make a very fine scanner indeed. Scanning stops when the scanner hits a busy channel, and it then resumes again on the condition selected by you: two seconds after the signal disappears, five seconds after it stops regardless of signal, or never. The 'never restart' option is ideal when you are working your way through unknown territory in the VFO. There is *no* chance of the scanner restarting again until you have properly identified your find, and decided whether you want to keep it or not.

VFO scan comes in three flavors: You can scan any one-MHz segment, a segment with limits you have programmed, or the entire frequency range of the receiver. As for memory scanning, you can scan a block of memory numbers you have specified, a selection of channels you have marked for scanning, or the entire memory system.

Remembering that the C558 contains two essentially independent receivers, you could set up the VHF receiver to scan everything between, say, 146 and 147 MHz, and the UHF receiver to scan only memories 2, 10, and 13 or simply to monitor a local channel. Both receivers always go on their merry ways, which is handy.

Another scanning method not yet mentioned is to run through all the standard **CTCSS** tones to determine which one a selected station is using. (This assumes you have the optional CTCSS decoder installed in the radio.) CTCSS tones are used more and more these days in the commercial arena, so several services can share the same channel. And since a tone from the transmitting station is needed to open the receiver's squelch, false openings from things like burglar alarms are very rare. Even as a listener, these advantages are yours too.

The C558 carries as standard the tone ENcoder needed to superimpose the correct CTCSS tone on your transmission. This is useful for things like energising a linking system along a series of repeaters. Other repeaters may require a CTCSS tone for any access at all in future. But for tone DEcoding you must cough up for the optional board.

The C558 has a full load of features associated with its DTMF keypad, such as **coded squelch** and **paging**. For code squelch the radio is set up so the squelch will not open unless a transmission begins with the correct series of three DTMF tones. This means if a calling station doesn't know your 'magic number', he's not going to raise you.

For paging, the transmitter sends out a burst of three digits for the called station, followed by three more to identify the calling station. This sets off a beeper in the station which receives the paging call. And the receiving radio displays the magic number of the calling station. I actually got to try this out for once between the C558 and a Yaesu radio which was also here for review. The two radios had a lovely time paging each other, and it showed that the tone system seems to be common across the various brands.

(Yes, Tom, the DTMF paging systems offered by all manufacturers is essentially the same across all ranges. An Icom can page a Yaesu, which can page a Kenwood, which can page a Yaesu and so

on. The DTMF feature has been offered on many radios in the past few years, and until recently has remained unchanged. The latest Kenwood TH-28 and TH-78, however, have added alphanumeric features to this, although my testing indicates that even these radios are still completely compatible with other radios in everything save the 'calling station' and message display features. The system was invented for use in Japan where station density on two metres, in particular, is very high, and a majority of users is still in the teenage years. Ed.)

Setting up...

The C558 has what must be the mother of all **SET** modes. Here is the part of the radio where you store important features and parameters which are set once and then seldom touched again. Here you set such things as repeater offset frequency, beeping behavior, and battery saver characteristics. All in all I counted 29 different features all hiding in the SET mode.

Some SET mode features: One particularly nice idea is to assign the repeater reverse function to the LAMP button. This makes reverse a simple one-touch command on a button right next to the PTT button. This of course disables the lamp, but the feature is reversible under SET. In my experience 99 per cent of HT users never use the light anyway. *(If you hit func-lamp — the function button then the lamp button — the light comes on and stays on until you hit this keystroke sequence again, and this feature still works with the reverse function set. Ed.)*

Another more esoteric SET MODE feature is an arrangement by which a radio clear across town can implant its memory channel information onto your radio by sending a sequence of DTMF tones. Beware, though: this function sends *all* transceiver parameters, not just selected ones, and will erase your settings entirely if you choose this option.

However, this means that if, after setting up all this stuff, your mate across town thinks you've done a good job, you can give his radio a 'mind transplant' using the SET mode's CLONE feature. This involves a four-minute frenzy of DTMF tones being sent over the air. Best to do it on a channel which isn't used in your area...

You can also program 'fixed duration transmission status'. I haven't found any mention of this anywhere else in the manual, but I gather it is some kind of watchdog timer which shuts off the transmitter if someone waffles too long. I suspect this has something to do with the cross-band repeater function which is also brought up in the set mode.

I couldn't test the remote feature because the battery went flat, announced by a little symbol of a torch cell on the display some minutes before the radio snuffed it. I did not have the correct battery charger, so that was the end of the tests. As for the cross-band repeater, I did test that and it didn't work. Perhaps it's been disabled for the Australian market.

What you have read here is not complete by any means. The C558 has many, many features, and there's no way you could describe them all in one magazine article. The instruction manual takes 85 pages to get through it all. So we have looked mostly at things which are different from run-of-the-mill HTs. The C558 verges on being over-complicated, but it's saved by the fact that so much of its complication is hidden away in the set-and-forget SET mode.

SET modes are usually pretty cryptic; for instance the instructions for another radio I recently reviewed sug-

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The antenna is constructed of fibreglass with copper helical windings. The exterior is covered with a coating of epoxy and urethane for added strength, durability and protection. Tap points or frequencies are clearly engraved for each band. Sockets are made from brass, nickel-plated.

The wander lead is used for quick, easy, manual band changing – just plug one end into the lowest socket, wind the remainder clockwise around the antenna and plug the other end into the required frequency.

The optional mounting base and spring is made of solid brass, nickel-plated, and the spring is zinc-plates spring steel.

An SO-239 is mounted on the side for feed termination. At the bottom of the base a threaded 1/2" hole is used for mounting to the vehicle via a suitable adaptor (not supplied).

All Outbacker antennas are capable of handling 300 Watts PEP.

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C. 80-40-20-15-10	$255.00

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gested that the only way to figure out what was on or off in the SET mode was to listen to the beeper! In the case of the C558, the left hand side of the display makes a pretty good attempt at displaying text to show what function was selected, while the right side clearly shows ON or OFF or some numerical value.

In fact, despite its extraordinary versatility and amazing array of functions, the C558 passed the 'not reading the instructions' test with flying colors. My first experiments with the radio came late one night after a long session playing with a band. Dead tired, but not yet ready for bed, I decided to see if I could make any sense of the C558 without using the manual. Even in my somewhat befuddled state I used simple logic to figure out how to program the memories and soon had several channels ready to go on both VHF and UHF.

When I finally opened the manual I got a pleasant surprise. I could actually *understand* it. Every explanation of every function was nice and clear, and was illustrated by drawings when appropriate. This is the second manual in a row I could actually read instead of trying to decipher it sentence by sentence. Maybe it's goodbye to Jinglish forever! *(You tempt Murphy mightily... Ed.)*

On the air

There's not a lot to say here. The C558's performance was faultless. I worked several stations both on VHF and UHF, through repeaters and direct. The transmitted signal report every time was 'good audio, nice and smooth, well modulated, crisp, it's definitely you, Tom' (well, maybe that *last* comment wasn't so good!).

The receiver was nice and sensitive on the amateur bands with no sign of overloading, even at my home where this is sometimes a problem. In the event of overload the SET mode provides a 15 dB receive attenuator which can be switched in as needed. I found no need for this, but it might be handy if you're mountain-topping somewhere there are powerful FM or TV transmitters. The speaker seems to be fairly large, and the sound is nice and full and very crisp indeed. The radio sounds better than most on AM, although a fairly healthy signal is needed to eliminate all hiss.

All in all, the C558 is a pretty decent radio. I didn't really flip over it — I guess I wasn't overly enamored with its looks — but it does what it's supposed to do without complaint. You know how it is with some radios; you sort of lust after one without even turning it on, just because it looks so neat. Well, the C558 isn't one of them for me. Maybe it's that button keypad, maybe it's the cluttered display, maybe it's the antenna which looks like it belongs on one end of a rubber hose, with a hot water bottle on the other end. *(Just shows how tastes vary. I think it's one of the nicest-looking HTs on the market! Ed.)*

But... I guess that's personal taste. As they say about women, looks aren't everything (cop that, feminists!) and deep down inside, the C558 could make you a very nice companion. If I were looking for a HT, it would *definitely* be a VHF/UHF model, and I'd certainly give the C558 very careful consideration indeed.

Amateur Radio Action thanks Standard's Australian agent **Emtronics** for the loan of the review unit.

C558 SPECIFICATIONS

Frequency range	tx	144.000-147.995 MHz (VHF) 430.000-439.995 MHz (UHF)
	rx	*hundreds* of MHz!
Operating voltage		6 to 16 volts (7.2V rated voltage)
Current consumption (approximate)		
Transmit:		
13.8V	High (5W):	1.2A VHF; 1.3A UHF
	Medium (2.5W):	0.9A VHF; 1.0A UHF
7.2V	High (2W):	0.85A VHF; 1.0 A UHF
	Medium (2W):	0.85A VHF; 1.0 A UHF
both	Low (0.35W)	0.4A VHF; 0.48A UHF
Receive:		
Both receivers		70 mA
One receiver		36 mA VHF; 45 mA UHF
Size:		55W X 130H X 31D (mm)
Weight:		355 g including battery and antenna
Receiver:		
First IF		21.8 MHz VHF; 23.05 MHz UHF
Second IF		450 kHz
Sensitivity		-10 dB (?)
S/N at 0.5V* input		30 dB *(didn't they *really* mean µV?)
Squelch sensitivity		-14 dB
Audio output		200 mW (8 ohms, 10% distortion)
Transmitter:		
Power output:		
High		
CBT151		2.0W VHF; 1.5W UHF
CNB151/153		2.5W VHF; 2.0W UHF
CNB152		5.0W VHF & UHF
Medium		
CBT151		2.0W VHF, 1.5W UHF
CNB151/153		2.5W VHF; 2.0W UHF
CNB152		2.5W VHF & UHF
Low		0.35W VHF & UHF
Modulation		Reactance
Max deviation		5 kHz
Spurious ratio		-60 dB or better

Feedback

Your letters to the Editor are welcome. They should be brief and to the point and, if selected for publication, may be subject to editing. Your letter *must* include your name and postal address, and your callsign if applicable, but these may be suppressed upon request, but always at the Editor's discretion.

Address your letter to **Feedback, Amateur Radio Action, GPO Box 628E, Melbourne, Victoria 3001, Australia.** As an alternative, you may fax your letter to (03) 670 9096 or (03) 602 1402

WIA...

Dear Sir,

Through the courtesy of ARA's Feedback Column may I have the privilege of congratulating John Russel of Albany WA for such an excellent and well-timed letter. (ARA Volume 15 number 8) It illustrates perfectly the closed minds and ultra-conservative attitudes of many members of the WIA.

Their lack of forethought and planning is steadily destroying an organisation which has done such sterling work for them in the past. Thankfully not all members of the WIA can be described thus, but it must be heartbreaking for any forward-thinking person attempting to resuscitate such a moribund society.

I had to smile when I read that John Russel considers the institute does not need to apologise for any mistakes it may or may not have made. His attitude is that there is no necessity to correct an honest mistake. (Or any mistake for that matter, JR?) The WIA is not such a deity that it is above such mundane matters. One would think more of the WIA if it did admit on occasion that it had made a mistake. As for competition... oh dear! Isn't the WIA *allowed* to have any competition? It might brighten its ideas up a bit if it did.

I used to listen to the weekly broadcasts until I got fed up with the same boring content and the biased off-the-cuff comments of various announcers. Like many others before me, I have no intention of becoming a member of the WIA until it at least rejoins the 20th century.

It is difficult to see any improvement occurring until the managing committee has more members intent on furthering the lot of the amateur fraternity generally — a task they were elected to do in the first place. Many of the present incumbents seem intent on merely maintaining the status quo; a policy which will eventually lead to the demise of the WIA.

name and address supplied

Editor's reply: perhaps you're being just a little rough there. Sure, the WIA can be something of an elephant from time to time but don't you think that it does achieve some things when it *really* tries?

Perhaps if more of us were to pitch in and *do* something when the call goes out, rather than just stand back and grumble that nothing will ever change, perhaps *then* something good might happen.

I'm not so much against the WIA as I am against its unwieldy company structure which makes it difficult for it to take the tough decisions. **VK3CE**

Editor's note: The following is an actual letter which I found a long time ago on **VK4BBS**. According to the sysop, the original was typewritten, and all spelling and grammar was carefully left intact, including errors.

To Mr. (name omitted) District Manager for Alabama
Radio Shack
3300 N. Pace Blvd
Pensacola, FL. 32505

Dear Sire,

This letter is complain about the problems I have having with the ham radio model number 19-1101 I had got from your company Radio Shack. I had this shipped special to me from your store 1096 Eastdale Mall Montgomery Alabama. I was got this because I think that i would get transmitt furthurthat I did with the TRC 217 40 channel walkie talkie.

The problem that had first was when I was going to hook this radio HTX-1000 to the antenna the conektor on the radio was wrong it wouldn't attach to my cable. I was able to hook it finally by making a small change in in the connektor. As soon as I tried to use it there was no sound coming at all. This happened for two days and I never did get to talk to anybody the whole two days. That day the cable company came knocking my door and said there was something causing problems at my house and disconnekted myradio from the cable line. you knew when i brought the Radio that I was going to use that for my antenne. You didn't tell me not to why not?

Next time I decided to put the HTX-1000 in my automobile I thought I would see how it worked their. I hooked it to my CB-antenna and at least I could hear people. But what happens now is no one wants to talk to me because they says you have to have a licencs to talk to them. Why? I dont have to have a licencs to talk on my CB. They'll talk to me there. Anyhow it dont matter much anymore becaus somebody done took the radio HTX-1000 rom my automobile.

What I would like for you Radio Shack to do is refund my money because I don't have the radio anymore and its not my fault i dont and I think you should give me back my money. Also the cable company here says that I hurt something in there line and want to be paid fix it. It will cost $27,482.98 to fix the equipment they say was damaged because you didnt tell me not to hook it to the cable. Please remit to me the check for $27,758.53 for damages due. To save this matter from going to court the check must be in my hand by June first or I will turn this over to my attorneys of law. Thank you

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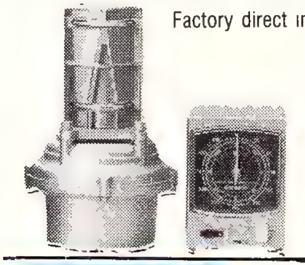

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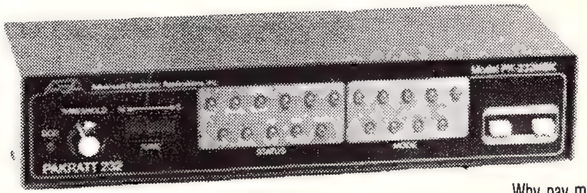

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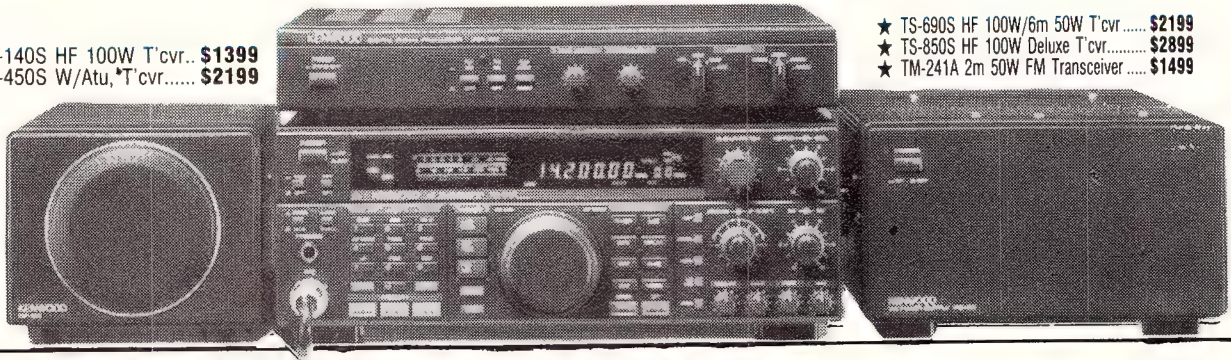

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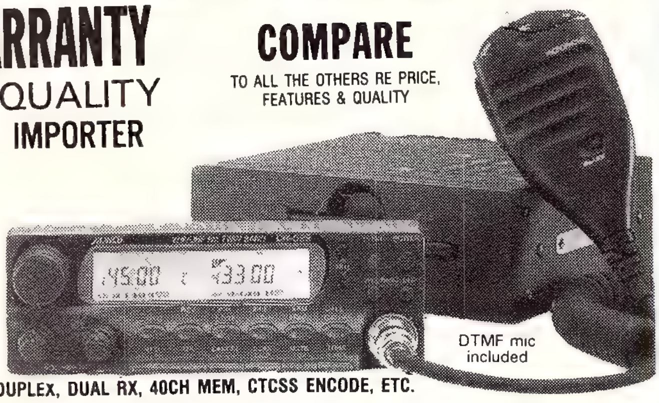

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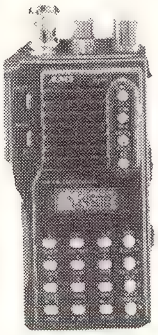

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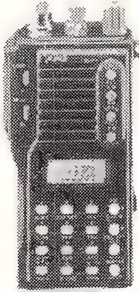

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HPM's safety switches
read this closely and *win a new radio*!

About five years ago a friend of mine was thrown from one side of an office to the other by a pretty nasty jolt from some cables he was working on. By profession this guy installed power cabling. He knew what he was doing — or so he thought. To this day he carries an enormous scar on the back of one hand to remind him that perhaps he doesn't know all there is to know about electricity.

A few months later an active, technically-oriented bloke I'd known for at least 20 years was electrocuted while working on something as simple as a tape recorder in his study. He was an engineer.

When I was a youngster I watched as a neighbor welded his metal watch-band to his wrist while installing a commercial two-way radio into his car... simply by somehow touching the business end of a 12 volt wire while leaning against the metal dash of the car! This fellow was an auto electrician.

How could three people who really should have known better have got it so horribly wrong? Could it be that they had come to take electricity for granted?

I sometimes marvel that I even survived my teenage years. I managed to give myself quite a few nasty zaps — a lot of my equally-ignorant friends did, too — and finally was talked into working on the bench with an alligator clip attached to a fold of skin on the end of each elbow. This arrangement had a wire running to a handy earth point at each end of the table. I managed to blow a hole in the end of one elbow one time using this remarkable apparatus! At least the current didn't flow through my heart...

Almost 30 years later I was reminded of my sore elbow when I watched as some very special high-capacity memory chips were installed in my laptop computer — the technician wore a flexible metallised bracelet with a curly wire running to an earth point on the static-free mat the computer rested on.

These days I treat electricity with a good deal more respect, but I've watched over the years as other people also learned the hard way, and wondered why the hell they didn't have as much sense as me... then smiled as I remembered the way I had learned, if that makes sense.

Life in the '90s is a whole lot different to life in the '50s and '60s, those years when I grew up. Everything — people, cars, aeroplanes, clocks and calendars — moves much faster than it did then, everybody has a phone and a telly (or six) — color ones at that — and every garage houses two cars.

And every house in the street is jammed full to the gunwales with electrical gadgets of every persuasion. Electric knives and electric can openers vie for space with electric clock radios and electric popcorn machines. Electric garage door openers give us access to electrical gadgets of a bewildering variety for the back yard. And on it goes.

Take a look at the average suburban house room of 30 years ago. It had a single power point — if it was lucky. 20 years ago you could count on it, and today, if the builder has an ounce of sense, he opts for at least two double power outlets in even the smallest of rooms in the house.

So you have four power outlets. What will you do with them? Simple: if you're anything like me you'll put a space-saving double adaptor on each of them and plug a power board — or two — into each of the eight outlets!

In fact, I jumped for joy when I saw the world's most wonderful power board at **Dick Smith Electronics**. Made by those understanding people at HPM Industries is a powerboard with balls: a full dozen outlets!! I rushed to Dick for two of these wonders (cat M-7120) and filled them up at once. Nowadays I use two powerboards just to drive other powerboards... I suppose I really should admit that I have (or had, at last count) 80 power outlets in my study/shack.

Now, before you go throwing your hands in the air, had it ever occurred to you to wonder how much current a NiCd battery charger swallows? How about the average digital clock? Or a two metre transceiver, for goodness sake?

Even if all of my appliances were plugged into a single power outlet they wouldn't over-rate it!

Nonetheless I was worried. I have two delightful young children who wonder about their daddy's gadgets. They are banned from the study, of course, but attention can wander and I rushed in when I found the door ajar one day to find Master One chewing on a live power cable.

The next day I rang the nice local electrician and had safety switches fitted to all power circuits in the house. I had started hearing advertisements on commercial radio stations in Melbourne for 'safety switches' about a year ago and had been 'thinking about it' ever since. But now I'm convinced, and I can be pretty sure I'm not going to hurt myself no matter *how* silly I am. Far more importantly, no amount of my stupidity and carelessness should any longer be likely to hurt my young children.

Maybe you're better qualified than I am. Perhaps you are an electrical perfectionist. But do yourself a big favor: *do* find out about these safety switches and *do* get them installed in your home. Now let's find out how they work:

Safety Switches, Earth Leakage Circuit Breakers (ELCBs), Residual Current Circuit Breakers (RCCBs), Residual Current Interrupters, Core Balance Detectors — they're known by many acronyms and trade names. Whatever shapes and sizes they come in, and however they're connected and configured makes no practical difference. They all perform the same function and all operate in much the same way.

So what do they do? They save lives.

Electrocution is, unfortunately, an all-too-common cause of death in today's gadget-driven society. In these cases, a coroner will usually report a 'death by misadventure' — in other words, if it was not accidental but there was some degree of negligence not amounting to criminal negligence, death is due to misadventure. Perhaps what they're *really* trying to tell us is that many, if not *all*, cases of electrocution can be prevented.

This is a serious subject that should be considered by every single consumer of electricity — *especially* by radio experimenters like us, for the old saying goes that familiarity breeds contempt. Electricity is a wonderful servant, but it makes a pretty awful master, and I don't know *how* many amateurs I've seen with a pretty dismal attitude to electricity... Of all the people who should know *exactly* what they're doing, some amateurs are just about the worst of all.

This problem is compounded by the sad fact that we often don't *get* a second chance to learn from a mistake. It's hard to demonstrate that you've learned your lesson when you're pushing up daisies.

Consider these facts about electrocution:

The primary causes of death are cardiac inhibition or shock, fibrillation of the ventricles, or asphyxia. Now if those words don't frighten the living daylights out of you, *nothing* will. They even *sound* lethal!

How *much* shock?

At about one milliampere, a definite shock can be felt.

Around 10 milliamperes, the shock is severe enough to paralyse muscles and may cause the victim to be unable to release his/her grip on the electrical conductor causing the shock. At approximately 100 milliamperes the shock is usually fatal if exposure is for one second or more.

What's that? Milliamps, not Volts? A person may be able to withstand 3000 Volts with barely a scratch, but could easily succumb to a mere 30 Volt shock. Why? It's all to do with skin resistivity. If the skin is dry and unbroken, the actual measured resistance between any two limbs may be in the order of 500,000 Ohms. However if the skin is not dry (through sweat, rain or whatever) and/or the skin is broken (cuts, abrasions), the resistance may fall to as low 300 ohms. (I = V/R. 100 mA = 30 V/300 Ohms.)

The greater the current travelling within the body, the greater the deleterious effects upon the central nervous system — it simply overloads the current-carrying capacity of the nerves and blocks normal responses.

The secondary effects of electric shock can prove to be just as disastrous as the primary effects. Even with a mild shock, a victim may be startled and meet an untimely demise by falling from the top of a tall ladder, or simply falling backwards from a chair.

How they work...

What does an RCD do to save lives? How does it work?

How these devices function is by precisely the same mechanism which prevents birds from suffering electrocution when perched atop a power transmission line. It's not that they were born with insulated feet, it's more that RCDs simply don't offer an electrical return path to ground. Obviously, the bird is at the same potential as the wire, but as it's nowhere near ground, no current can flow...

That's not to say that an active-to-ground connection is the only possible way to get a shock. An active-to-neutral or active-to-active path in a multiple-phase supply is just as savage, if not more so. So be warned.

Safety switches are simple devices which measure the difference between the supplied current (AC in our case) appearing at the active terminal of a given electrical line, and compare the return current, after consumption, delivered to the neutral line. If there is an imbalance in the two, the safety switch responds and cuts (virtually instantaneously) the delivered potential to the active line. This imbalance would exist when there is an effective earth-return path — either through a faulty electrical appliance, or through human tissue.

By sampling the voltage developed across a suitable resistor placed in series with the mains active supply line, an accurate indication of current may be obtained. By sampling the return neutral line in the same way, if all is well, the current will be precisely the same. Any imbalance (through leakage to earth or whatever) will show up as a fault condition and trip a series-operated relay causing it to interrupt the supplied current.

The time it takes to trip this protective circuitry is dependent on the transient response characteristics of the balance circuitry and the mechanical switching time (ballistics) of the relay. Most commercially-available safety switches are designed to act within the quasi-industrial standard of, or less than, 30 milliseconds.

These devices are also set to trip at a maximum leakage current of 30 milliamperes (some units are to designed to operate at 15 milliamperes or less — especially in hospital applications). Now, depending where, at any given point in time, the voltage level is along the sine-wave curve of the alternating current electrical supply, and the physical return path presented to earth through the body, the sensation of shock may vary from nothing to a resounding tickle of varying severity.

At 30 milliseconds, this represents one and a half complete electrical cycles at 50 Hertz, and a mere thirtieth of an average heart-beat! This is hardly enough to cause more than the tiniest flutter of the heart and a very, very brief jolt — a warning. If you're lucky and tried to cook yourself on a protected circuit the blackness will only come because the lights have gone out.

How does current leak to earth?

When AC electricity is generated at a power-plant, two conductors must exist to complete the circuit: a supply and a return — an active and a neutral. For all practical purposes, the neutral line is tied to earth. It is, therefore, even while carrying current, always effectively at zero potential. Some electricity-supply authorities (especially in remote areas — due to costs of the extra copper wire and other technical reasons) provide only an active line to the consumer, and expect a return line to be provided by the earth itself — such is the conductive power of the Earth's crust. It is, therefore, a simple matter for a human to become the link that closes the supply-return loop.

High voltages can easily supply sufficient currents to earth through shoes of *any* construction — even rubber — if there is sufficient contamination (dirt, grease, water or the like) of the material to act as a resistance by creating a current path from the inside to the outside of the shoe by passing over or through the material.

To this end, the most rudimentary form of earth-leakage shock protection is to locally isolate the power supply by using an isolation transformer. As in any transformer which has no electrical link between its input and output (other than electro-magnetic) there is no longer an electrical reference to earth, and therefore, the risk of this type of shock is virtually eliminated.

Unfortunately, this solution can not applied globally, as potentially lethal voltages could appear at the neutral terminal due to direct lightning strikes on power lines, or faulty consumer equipment being connected somewhere else in the circuit.

Localised electric shock occurs when, for example, an earth return path is only provided between two adjacent fingers. This shock is far less dangerous than one which travels in parallel with the central nervous system, and therefore does not directly negatively stimulate the cardiovascular system.

But be warned: a safety switch can only provide a certain level of security. It is *not* the be-all and end-all of safety devices. Nothing can substitute for commonsense where lethal currents and voltages are concerned. By the same token, it should not be construed, in any way, that a single safety switch connected to all household circuits is the safest solution. There could be nothing worse (and more dangerous) than being suddenly plunged into total darkness in a window-less basement while perched atop a ladder when the lights go off because a column-oil-heater somewhere else in the house develops a minor but inconsequential fault and shuts down everything from the fuse-box...

Instead, it is far more logical to install individual safety switches to the different circuits in a household. One could cover all lighting circuits (but this one isn't all that important), as long as you have one for each powerpoint circuit.

These may be by way of switches located at the meter box (or wherever your fuses are) by using a HPM H3ELM for each circuit or — better, to my mind — by having the protection at the first powerpoint in each circuit, and that's the way I chose to go with HPM's 777EL30s. If you want the extra protection usually found in hospitals, go for the HPM 777EL10, which cuts the power when earth leakages reach just 10mA.

HPM also offers its 'Electresafe' power switches in a range of portable plug-in devices and powerboards, so every option is covered.

Remember, where electricity is concerned, *always* think twice about what you are about to do — then act once and safely.

Remember, silent keys are cheap and easy to buy...

Amateur Radio Action thanks **HPM** for the supply of numerous electrical safety devices used in the preparation of this article.

How to Win...

Now for the bit you've been waiting for:

This month's front cover photograph is wrong. In fact, what it's showing is downright bloody dangerous — or, at least, it *would* be if it were real.

We set up the rather ridiculous scene depicted on this month's front cover just to see how very observant you really are — and you'll need to be very observant if you're to win this month's great prize of a fabulous **Yaesu FT-415** hand-held transceiver courtesy of **Dick Smith Electronics** and **Amateur Radio Action.**

On a plain sheet of paper write your name and address and a telephone number where you can be reached — home and work numbers if at all possible — and write in 100 words or less what you think is wrong with the scene depicted on the front cover of this magazine. For your entry to be considered you must also enclose with your entry the 'corner flash' from the bottom of this page unless you live in a state where attaching proof of purchase is prohibited by law.

Remember, this time we're not looking for upside-down words (we sincerely trust you won't find any of those!), we're interested in the picture itself. What are those gloriously-manicured editor's hands *doing*?!! Just jot down (in point form if it helps) all the things you think are wrong with the cover photograph.

The winner's name will be announced in our February edition, due on sale on February 16, 1993. The closing date for entries is last mail Friday, February 5, 1993.

The prize will be awarded to the person whose entry most closely agrees with the editor's view of what's wrong with the photograph. Entries will be accepted by mail only. Only one prize is available to be awarded. The editor's decision on the winner is final and no correspondence on the matter will be entered into. This competition is open to all residents of Australia other than employees and their immediate family of **Syme Media Pty Ltd, HPM Industries Pty Ltd** or **Dick Smith Electronics Pty Ltd**, their associated companies or advertising agencies. All entries become the property of Syme Magazines. This competition is invalid in states where it is illegal. Entries received after the closing date of February 5, 1993 will be declared ineligible for entry. These conditions form the rules of the competition.

Post your entry — with the corner flash — to **ARA HPM/ Yaesu Competition, GPO Box 628E, Melbourne, Victoria 3001**

ARA 15/9

Remember, send the corner flash with your entry!

DICK SMITH ELECTRONICS

New Year Clearance Specials

FT-411E 2m DELUXE HAND HELD

Proven performance, ease of use and great value for money have been the hallmarks of the FT-411e 2m handheld for many years now. But with new models coming soon, we're clearing our stocks of new and ex-demo FT-411Es to make room for the new arrivals. So rush in and pick up a bargain, while stocks last!

- 144 to 148MHz transceive operation, with enhanced receiver performance
- Ultra long life 1000mAH 7.2V NiCad battery pack (supplied as standard!)
- 2.5 watts RF output as standard, 5 watts with 12V DC (or optional FNB-11 NiCad)
- Better than 0.16uV (12dB SINAD) sensitivity
- Programmable power saver (stand-by current only 7mA with 1 sec save)
- Keypad or dial frequency entry, with selectable tuning steps
- 49 tuneable memories which store repeater offsets
- Band, memory, priority or limited-band scanning
- Just 55 x 155 x 32mm
- Carry case, belt clip, carry strap and approved AC charger
- Now with enhanced receiver sensitivity and improved strong signal handling!

Cat D-3350

2 Year Warranty

Save $30

$449

(Even less for ex-demo units)

FT-650 6m,10m,12m 100W TRANSCEIVER

Now's the time to enjoy the summer DX season on the 6m and 10m bands, and the Yaesu FT-650 mobile transceiver allows you to do it in style. It's all-mode operation, 100W RF output (SSB, FM, CW), and continuous 24.5 to 56MHz receiver coverage allows you to hear signals outside the Amateur bands, so you can track the rising M.U.F and work stations as soon as the band opens. The use of 3 D.D.S.'s and a 2-stage low noise RF pre-amp results in a very quiet and sensitive receiver (SSB/CW, 0.125uV) so you'll hear weak signals much more easily. To cater for the FM enthusiast, the FT-650 provides repeater offsets, an FM narrow mode as well as exceptional 0.16uV (12dB SINAD) sensitivity. Other features include selectable tuning steps, manual/auto IF notch filter, RF speech processor, IF shift control, 105 scannable memories and an effective noise blanker. Includes MH-1 hand microphone.
Cat D-3250

2 Year Warranty

Now Only **$1995**

FT-990 H.F ALL-MODE TRANSCEIVER

The FT-990 offers many of the advanced features of the legendary FT-1000, yet in a more compact and economical base-station package. Its excellent front-panel layout, together with clear labelling, a large back-lit meter and an uncluttered digital display provides very straightforward operation. The receiver performance is excellent, with a very wide dynamic range front-end circuit and two DDS's providing a very low noise level and excellent sensitivity over the 100kHz to 30MHz range. Transmitter output is 100W on all HF Amateur bands (SSB, CW, FM) with the internal AC power supply allowing high duty cycle transmissions. An internal auto antenna tuner with 39 memories is a standard feature, while the customizable RF speech processor and Switched Capacitance Audio filtering facilities are unique to the FT-990. Other features include IF Shift and IF Notch, IF bandwidth selection, an effective adjustable notch filter, 500Hz B/W CW filter, 90 memories and one-touch band selection. Microphone optional extra.

2 Year Warranty

AC version FT-990	Cat D-3260	**$3495**
DC version FT-990 (upgradeable to AC version)	Cat D-3255	**$3195**

B1440

YOUR ANTENNA SUPERMARKET

We carry a wide range of antennas and accessories. Here are just a few...

HUSTLER RX-2 2m ⅝ WAVE MOBILE

Here's value! A quality American 2m ⅝ wave magnetic mount antenna for mobile or temporary base station use. Comes complete with 4.5m of coax cable with a PL259 attached. It provides 3dB gain with a power rating of 100W maximum, and uses a flexible stainless steel whip to minimise wind loading.
Cat D-4805

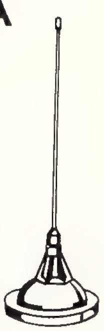
$49.95

HUSTLER ¼ WAVE MAGNETIC ANTENNA

HUSTLER

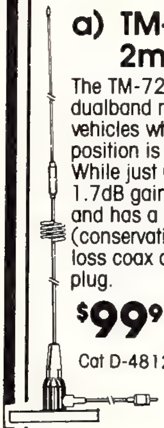
A great idea for extending the range of handheld transceivers! The Hustler UGM is a compact ¼ wave magnetic mount mobile antenna supplied with 2.1m of mini coax fitted with a BNC plug. Simply use the supplied frequency chart to cut the flexible stainless steel whip to the required length for your application (within the 140-500MHz range) and it's ready to use.
Cat D-4802

$39.95



DUALBAND MOBILE ANTENNAS

Our exclusive range of Brainer 2m/70cm antennas provide excellent performance at a reasonable price. They feature quality Japanese construction and come complete with detailed, locally written instruction sheets so you can get the best from your mobile station.



a) TM-723m MAGNETIC 2m/70cm ANTENNA

The TM-723m is a compact, slimline dualband mobile antenna ideally suited to vehicles where a permanent mounting position is not available (eg. a company car). While just 0.7m long, the TM-723m provides 1.7dB gain on 2m and 4.7dB gain on 70cm and has a maximum power rating of 50W (conservative). Supplied complete with low loss coax cable fitted with a moulded PL-259 plug.

$99.95
Cat D-4812

New for '93

BRAINER

b) ST-7500 2m/70cm ANTENNA

The ST-7500 is a compact, medium gain dualband antenna that provides good performance when gutter or roof mounted. It's just 1m long, provides 3dB gain on 2m and 5.5dB gain on 70cm and has a maximum power rating of 150W. A quality tapered stainless steel whip element and an inbuilt tilt-over mechanism make the ST-7500 ideal for use on vehicles that often have to enter garages or carparks. Requires an SO-239 antenna base (D-4035 or D-4052 recommended), or SO-239 magnetic mount (D-4520).

BRAINER

$79.95
Cat D-4810

c) ST-7800 DELUXE 2m/70cm ANTENNA

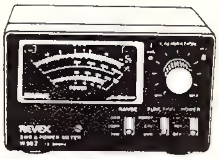
Our best dualband mobile antenna! The ST-7800 is ideal for long range mobile operation, providing high gain (4.5dB on 2m, 7.2dB on 70cm) from its 1.5m length. Like the ST-7500, it incorporates an inbuilt tilt-over mechanism to allow laying the antenna over when entering carparks, and it can either be gutter or roof-mounted with good results. With its high gain and 150W power rating the ST-7800 can also be used successfully as a temporary base station antenna. Requires an SO-239 antenna base (D-4035 or D-4052 recommended).

BRAINER

Cat D-4815 **$129.95**

New for '93

REVEX SWR/ PWR METERS



Revex meters feature quality Japanese construction, large meter movements and low-loss wideband SWR/PWR sensors. We carry 2 of their popular models, the W502 and the W540, each of which provide 3 power reading scales plus SWR measurement, but with differing frequency coverage.

W502 HF/6M METER

Covers 1.8 - 60MHz and has an accurate P.E.P metering circuit. As well, it has 20W, 200W and 2kW scales and a backlit meter. Requires 13.8V DC.
Cat D-1360

$239

W540 VHF/UHF METER

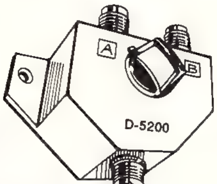
Covers 140 - 525MHz and has an average-reading metering circuit. It has 4W, 20W and 200W scales. Requires no DC power.
Cat D-1370

$199

Great Price!

2 POSITION COAX SWITCH

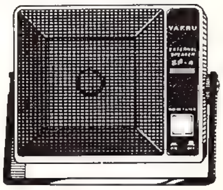
Cat D-5200 **$39.95**



A heavy duty, 2 way coax switch that's suitable for Amateur, or commercial applications. It's well constructed with a die-cast case and can handle up to 2kw PEP or 1kW CW at 30MHz with less than 0.2dB insertion loss.

YAESU SP-4 EXTENSION SPEAKER

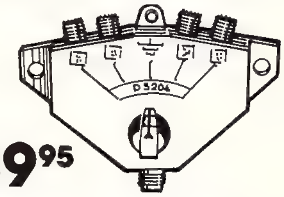
$39.95



This quality speaker has a built-in switchable noise filter and comes with a swing mounting bracket. It handles 3W at 8 ohms and looks smart alongside any RF rig. Comes complete with lead and 3.5mm mono plug.
Cat D-2300

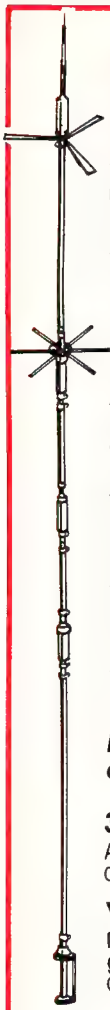
With Surge Protection

4-WAY COAX SWITCH



$89.95

A high quality 4-way coax switch featuring rugged die-cast aluminium construction, 2kW P.E.P. (max.) power handling at 30MHz, and only 0.3dB insertion loss. It has an in-built surge suppressor and automatic grounding of all un-used connections..... in conjunction with a 'ground' position on the switch, it helps protect against lightning induced surge damage.
Cat D-5204



RUGGED HUSTLER HF 5-BAND TRAP VERTICAL ANTENNA

The tradition continues! The 5BTV is yet another masterpiece from the people who have been making antennas for over 33 years. This rugged 5 band HF trap vertical uses Hustler's exclusive trap design (25mm solid fibreglass formers, high-tolerance trap covers and low loss windings), for accurate trap resonance with 1kw(PEP) power handling. Wideband coverage is provided on the 10, 15, 20 and 40m bands (SWR typically 1.15:1 at resonance, less than 2:1 SWR at band edges), with 80kHz bandwidth typical on 80m at less then 2:1 SWR. An optional 30m resonator kit can also be installed without affecting operation of the other bands.

High strength aluminium tubing and a 4mm (wall thickness) extra heavy-duty base section provides optimum mechanical stability. What's more, stainless steel clamps and hardware guarantee a longer life. At just 7.65m, the 5BTV can be ground mounted (with or without radials, although radials are recommended), or it can be mounted in an elevated position with a radial system. Unlike other antenna designs the 5BTV can be fed with any length of 50 ohm coax cable.

Cat D-4920

Hurry, last chance at the old price!

$299

Made in USA

30m RESONATOR KIT

Adds 30m coverage and includes all hardware.

Cat D-4921

$89.95

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2m/70cm ANTENNA GST-1

Frequency: 144-148MHz, 430-440MHz
Gain: 6.0dB(2m), 8.0dB (70cm)
Max Pwr: 200W
Length: 2.6m
Type: 2 x ⅝ λ colinear (2m), 4 x ⅝ λ colinear (70cm)
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Max Power: 100W
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Connector: N-type
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Frequency: 144-148MHz, 430-440MHz
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Connector: SO-239
Cat D-4835

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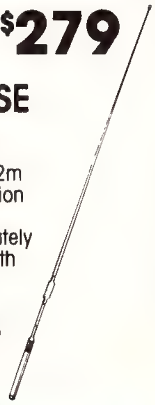

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AMATEUR RADIO THEORY

1992 AOCP Theory Course

Part eleven

By Paul Butler, VK3DBP
Brighton, Victoria

The best antenna in the world is no good at all if it cannot be connected correctly to a transmitter or receiver. The connection is not just any old bit of wire, either — its electrical characteristic must be chosen carefully to suit the installation. The link from antenna to transmitter or receiver is known as a **transmission line** and is the focus of this month's article.

A *transmission* is used to carry RF energy from one point to another. The transmitter, receiver and other gear is usually located inside a house (or 'shack'), while the antenna braves the elements on top of a tower or strung between trees. The transmission line needs to convey energy efficiently, so it must have as low a loss as possible, and it must be matched to the devices it joins. To achieve these conditions, the nature of an RF signal passing along a conductor must be understood.

The main point to understand about sending RF down a wire is that it does *not* travel (propagate) at an infinite speed. The speed of light is so high that we generally regard it as infinite. However, a pulse of radio-frequency energy propagates down a transmission line at a speed less than that of light, and that figure can vary from about 65 per cent of the speed of light to about 97 per cent in practice, with the amount of variation depending on a quantity called the *velocity factor* of the line. Even this is pretty fast, but it's not fast enough, as a quick calculation shows.

Imagine sending our RF pulse along a line 300 metres long. At the speed of light in air or vacuum, the pulse would take one millionth of a second (or one microsecond). But one cycle of an RF signal of frequency 1 MHz lasts for this same length of time. At 10 MHz, a single cycle takes one-tenth of this time. In these and similar situations, when the propagation time cannot be ignored, transmission line theory must be used to determine the electrical characteristics needed.

Take the two most common transmission lines used, the *coaxial cable* and the *parallel-wire line*. The coaxial cable, or coax, consists of a central conductor surrounded by a second conductor, the outer, from which it is electrically isolated by a dielectric medium. The dielectric is often plastic but may be air or another insulating material.

The parallel-wire line consists of two conductors arranged side-by-side at a fixed distance apart and again isolated from one another by air or plastic. Equal currents flow in a correctly operating parallel-wire transmission line, so it is often called a *balanced line*. The coaxial cable is an *unbalanced line*.

The close proximity of two conductors separated by an insulating medium resembles that of a capacitor. In practice, the line behaves like a linear capacitor. The conductors have inductance, however, so the transmission line can be though of as a series of capacitors and inductors arranged as in **Figure 1**, below.

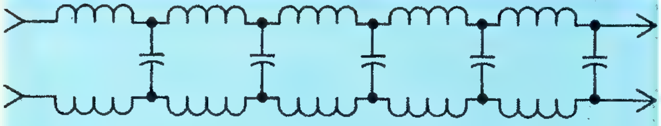

Figure 1: Equivalent of a transmission line in lumped circuit constants.

Because of the presence of inductance and capacitance, a transmission line is said to have a characteristic impedance, often referred to as Z_0. In an ideal line, the impedance is purely resistive (see complex impedance, covered in an earlier article) and is loss-free. Practical transmission lines have resistance in their conductors and leakage in the dielectric, and so they do exhibit some loss.

The inductance and capacitance associated with a transmission line depend on the physical dimensions of the line — the closer the conductors and the greater their size, the higher the capacitance and the lower the inductance. Large, closely-spaced conductors produce a line with low impedance; small, widely-spaced conductors produce a line with high impedance.So far, we have considered an infinitely long transmission line. In practice, a line is terminated by a load, to which it is said to be matched if the load is a pure resistance equal to the characteristic impedance of the line. Under these conditions, RF energy passing along the transmission line is eventually absorbed by the load. A pulse will travel from the source to the termination, where some is absorbed and some reflected back towards the source. The reflected pulse is reflected from the source and on reaching the termination, some more is absorbed and a weaker pulse sets off back to the source. After a while, all the energy is absorbed by the load.

But what if the RF energy is not a pulse but a continuous wave? As a particular cycle leaves the source, it meets other cycles which have been reflected from the load. The voltage at any point along the line is, therefore, the sum of the waves travelling in *both* directions along the line. The sum of the waves travelling from source to load is called the forward wave, while the sum of waves travelling back from the load to the source is called the reflected wave.

At some points along the line, the forward and reflected voltages will be in phase (in step) and add together constructively to produce a net voltage greater than each one separately. At other points, the voltages will be out of phase and add destructively to produce a net voltage less than each one separately. These maxima and minima form a standing-wave pattern. The ratio of the maximum voltage on the line to the minimum voltage on the line is called the *voltage standing wave ratio* or *VSWR*, often abbreviated to *SWR*.

The nature of the load determines the VSWR for a given application. A resistive load matched correctly to the line will produce no standing waves. This requires the load to be resonant at the frequency in use (again, see the earlier article on resonant circuits). For any other condition, standing waves will exist because of the difficulties associated with matching the load exactly to the line. Either the resulting VSWR must be tolerated or some form of matching must be introduced between the line and the load.

Every antenna and every transmission line has its characteristic impedance. Any antenna can, therefore, be used with any line as long as the impedance is transformed to achieve a match. A common impedance transformer consists of a quarter-wave section of transmission line. The impedance of this section of line, to be placed between the main transmission line and the antenna, is determined by calculation and this in turn fixes the physical characteristics of the matching transformer (see **Figure 2**, below).

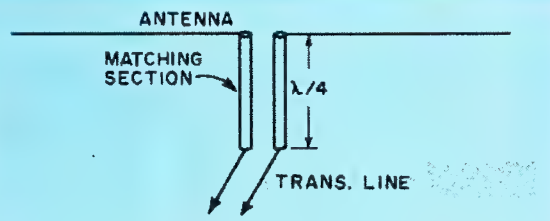

Figure 2: "Q" matching section, a quarter-wave impedance transformer.

For a coaxial line, a transformer can be constructed as a series section as shown in **Figure 3**, below.

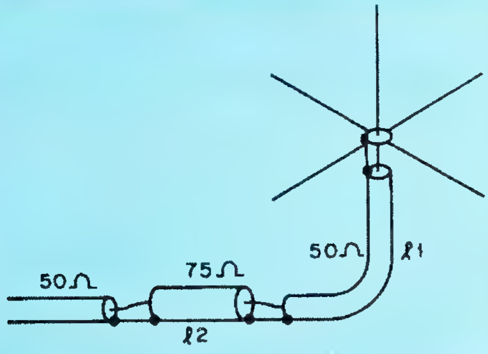

Figure 3: Example of series-section matching.

The dipole antenna was mentioned last month. Its impedance is low enough for 50 ohm or 75 ohm coaxial cable to be used as the transmission line. Folding the arms of the dipole into a folded dipole configuration has the effect of raising the characteristic impedance. If the upper and lower sections are identical, as described, the impedance rises to 300 ohms, just right for feeding with a 300 ohm open-wire TV ladder line.

That's not the whole story, however. By making the upper and lower sections of different diameter, or by adding further folds, the impedance can be adjusted to just about any value needed. The antenna acts as an impedance transformer as well as a resonant radiator, which is quite a versatile arrangement!

Yet another impedance matching device is the *gamma match* (or sometimes a *T match*). A pair of points can be chosen along the length of the antenna such that the impedance between them is purely resistive and the value of which can be controlled by the spacing of the two points chosen and so matched to the line. The T match can be used with a balanced two-conductor feeder line, as shown in **Figure 4(A)**, below, while the unbalanced gamma match, named for its resemblance to the Greek letter gamma, can be used with a coaxial line, as in **Figure 4(B)**, below.

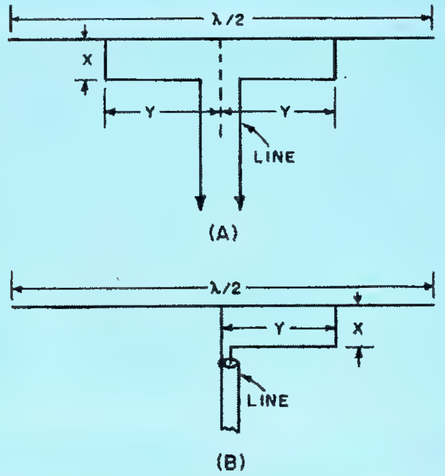

Figure 4: The T match and gamma match.

An antenna which is symmetrical relative to the feed point, such as a dipole, is best fed by a balanced feed. Often, however, it is more convenient to use coaxial cable as the feedline, since it easy to handle and does not need to be supported in the same way as a balanced line. The impedance of a simple dipole is close to that of commonly-used coaxial cable, too. This arrangement, however, upsets the inherent balance of the dipole and can cause unwanted RF currents to flow in the feedline. To match a balanced antenna to an unbalanced line, a *balun* is needed. The name derives from its purpose — BALanced-to-UNbalanced transformer.

A balun consists of two coils wound onto the same core, with the ratio of the turns arranged to provide the necessary change from balanced to unbalanced without changing the impedance 'seen' by the transmission line and antenna. Impedance transformation may be incorporated into the balun as well. A 4:1 turns ratio, for example, will effectively match a 300 ohm balanced line with a 75 ohm unbalanced line, should the need arise.

Given a particular combination of transmitter, feedline and antenna, the optimum conditions may not be achieved without a little extra help from an antenna tuning unit (ATU). The term ATU is often replaced by 'antenna coupler' or, in ARRL publications, the term 'Transmatch', since this kind of device is designed to match a transmitter's output to any load presented to it. The device consists of an adjustable series or parallel tuned circuit — some examples are shown in **Figure 5**, below. A series tuned circuit such as (**A**) or (**C**) is usually used with a low-impedance load, while a parallel-tuned circuit like (**B**) or (**D**) is preferable for a high-impedance load.

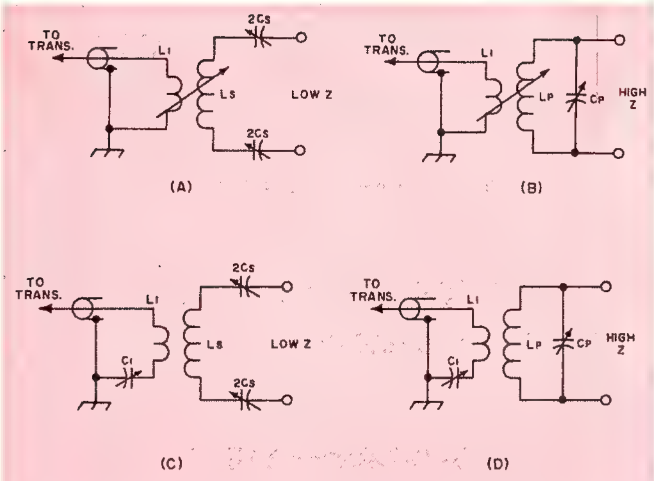

Figure 5: Simple circuits for coupling a transmitter to a balanced line.

Coming up, some questions to make you think a little. But before we look at those, here's a quick run-down of last month's questions and an explanation of some of the answers:

Question 1 — (c)
A half-wave dipole of length 0.30 metres will resonate with radio waves of wavelength approximately twice its length, ie 0.60 metre. To turn this wavelength into a frequency, remember the wave equation

velocity = frequency X wavelength

The velocity of radio waves in free space is 300,000,000 metres per second, so the frequency in this case will be this figure divided by 0.60, or 500,000,000 Hz. This rather large number becomes less threatening if we express the frequency in megaHertz (MHz), remembering that there are one million Hertz in one megaHertz. Knocking six zeroes of the end, we get 500 MHz.

Question 2 — (c)
Waves travel more slowly in the metal conductor of an antenna than in free space — remember the velocity factor. This has the effect of reducing the wavelength, so the antenna must be shorter to resonate with the RF energy pumped into it by the transmitter.

Question 3 — (a)
Like Question 1, but going the other way! Wavelength equals velocity divided by frequency, or 300,000,000 divided by 28 MHz or 28,000,000 Hz. This gives a wavelength of about 10.7 metres. But a dipole is half a wavelength long or about 5 metres in this case.

Question 4 — (c)
Adding an inductor in series with an antenna is equivalent to adding some extra conductor on the end. Increasing the overall length in turn increases the wavelength at which the antenna will resonate. This means that it will now resonate at a lower frequency, since frequency and wavelength are in inverse proportion to one another.

Question 5 — (a)
See **Figure 1**(**A**) in last month's article. For resonance at the fundamental frequency, the current is maximum at the center, while the voltage is zero.

Question 6 — (c)
As we saw last time, folding the arms of a dipole has the effect of increasing the impedance of the antenna. Note that, as we have just seen, careful selection of materials allows the antenna designer to adjust the terminal impedance to any value.

Question 7 — (d)
This follows on from the argument for **Question 6**.

Question 8 — (c)
As explained last time, the V-beam fires its RF energy along its axis mainly in one direction, making it essentially uni-directional.

Question 9 — (a)
An omni-directional antenna, like the quarter-wave ground plane antenna, fires in every direction. The other three antennas, the Yagi, log periodic and parabolic reflector, are all designed to be directional.

Question 10 — (c)
Not only does the quarter-wave ground plane have an omni-directional radiation pattern, it also emits radiation at a low angle to the horizontal. This makes it very useful for HF work, when you are trying to encourage your radio waves to bounce off the ionosphere rather than pass straight though it!

Okay, now here are *this* month's questions.....

1. The radiation resistance of an isolated half-wave dipole is approximately:
(a) 50 ohms
(b) 75 ohms
(c) 100 ohms
(d) 120 ohms

2. The feedline which would correctly match the impedance of a folded dipole is:
(a) 50 ohm coaxial cable
(b) 75 ohm coaxial cable
(c) 90 ohm balanced line
(d) 300 ohm balanced line

3. The voltage standing wave ratio for a properly matched transmission line is:
(a) 0:1
(b) 1:1
(c) 10:1
(d) 100:1

4. The core material which would *not* be suitable for use in a 3 to 30 MHz antenna balun is:

(a) air
(b) powdered iron
(c) ferrite
(d) solid iron

5. The most effective method of matching between transmission lines of differing impedances is by means of a:
(a) quarter-wave stub
(b) balun
(c) coupling capacitor
(d) half-wave stub

6. The input impedance of an unterminated transmission line half a wavelength long is:
(a) maximum resistive
(b) minimum resistive
(c) maximum inductive
(d) minimum capacitive

7. In a transmission line which is terminated in its characteristic impedance:
(a) the ratio of the rms values of voltage and current is constant at all points
(b) all energy arriving at the receiving end is reflected
(c) voltage and current are out of phase at all points and increase with frequency
(d) no energy is absorbed by the load

Cheers for this month from Paul, VK3DBP.

Answers

1(b), 2(d), 3(b), 4(d), 5(b), 6(a), 7(a).

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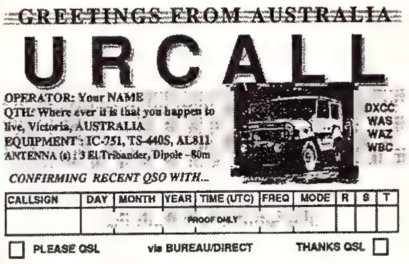

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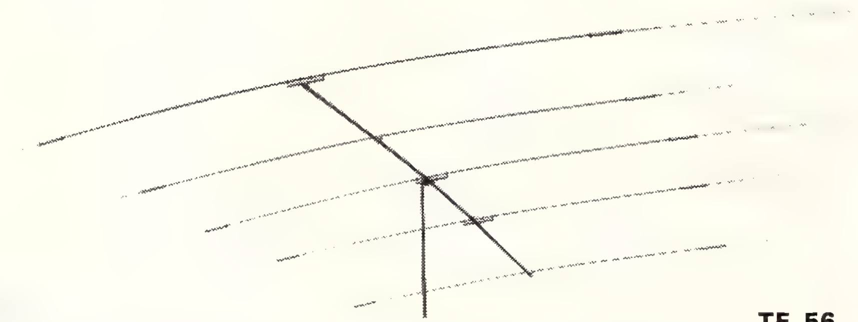

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Element	4	3	2	2	1	1	3	2	3	1	1	1	5
Gain (dBi)	9.1	8	4/6/6	6/6/6	2 2	2.2	8	6	8	2.2	2 2	2 2	8 5,8 5,9.5
F/B Ratio	25/20/20	21/15/16	20/14/12	13/10/10	0	0	25/20/20	12/10/10	25/20/20	0	0	0	25
V S W.R.	ACROSS THE BAND 1.6 OR BETTER												<1 5
Max Power	2KWpep	2KWpep	1KWpep	2KWpep	2KWpep	2KWpep	2KWpep		2KWpep		2KWpep		3KW
Impedance	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	~50ohm		~50ohm		~50ohm		50
Element L	7 5m	7 3m	5m	7.3m	7.2m	8 5m	10 47m		10 47m		10 47m		10 6m
Boom L	6m	4.28m	2m	2m	—	—	6 28m		4 28m		—		4m
Turning Ratio	6m	4 5m	2 74m	4m	3 6m	3 6m	6.0m		5 1m		5 23m		6 3
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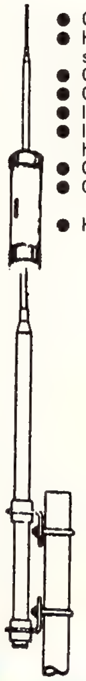

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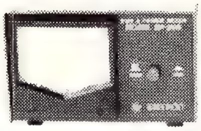

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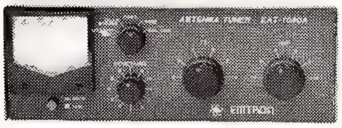

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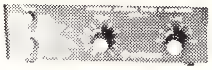

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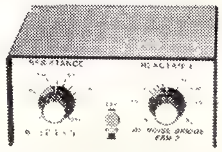

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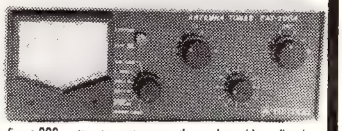

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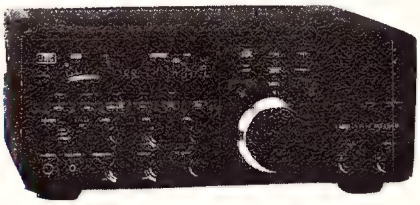

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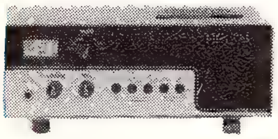

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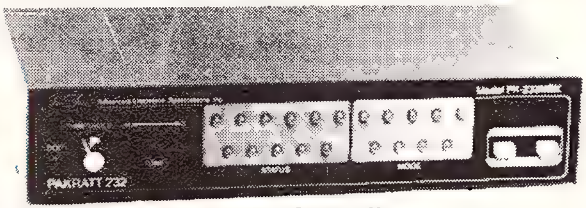

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All times are expressed in Coordinated Universal Time (UTC or 'z'). Add 10 hours for Eastern Standard Time, 9.5 hours for Central Standard Time, eight hours for Western Standard Time and 12 hours for New Zealand Standard Time). Add one extra hour in locations where Daylight Savings Time applies.

Dropping like rain...

The radio arm of US evangelist Dr Gene Scott continues to expand at break-neck pace, with new relay arrangements materialising at what seems like every week. **WWCR** in Nashville reserves one transmitter solely for the use of the redoubtable Dr Scott, and there is also a significant presence on the **High Adventure** stations, **KVOH** Los Angeles, **KHBN** Palau and **King of Hope** in Lebanon. In addition, the **Caribbean Beacon** on Anguilla, 1610 kHz, was recently observed in the eastern states carrying Dr Scott's brand of gospel teaching and musical choice.

Although full details are unconfirmed at this point, the latest string to the bow of our cigar-smoking preacher appears to be the use of high-powered transmitters in the former Soviet Union, which will surely give his **University Network** extensive coverage the world over. Facilities at Novosibirsk and Samara are thought to be at Dr Scott's disposal, and the strong signal on 21,845 kHz in our late afternoons (from 0400 until about 0700z) is believed to be coming from the former site. If you can stomach listening to the programming for any length of time, there are occasional references to the shortwave facilities, which add to our knowledge of the total picture.

During a recent broadcast I heard Dr Scott state that "...it is God's will for this ministry to drop like rain on every corner of the globe..."; he went on to request donations of $1,000 "...by Sunday..." from each of his listeners to help with the further expansion of his radio outreach. Shortwave transmitter time does not come cheap.

In further Gene Scott news, the reactivated **KCBI** in Dallas is believed to be all set to carry the University Network, as evidenced by tapes played during the initial testing phase in late November. You may recall that KCBI appeared on the scene many months ago with frequency registrations, but it seems that only now the project will bear fruit. Watch 15,375 and 9815 kHz for this one.

More gospel by radio

Not to be outdone by Protestant evangelists, the Catholics are also getting in on the act, and the giant transmitting complex of **WEWN** in Alabama is expected to be fully operational by the end of December. Test transmissions will already be well under way by the time you read this, from four 500 kW senders, which are to relay most programming from an established Catholic-influenced cable TV network in the US. It should be noted that WEWN is not an official outlet of the Roman Catholic Church in the same sense as the Vatican Radio.

A projected schedule is to hand, though there are ambiguities and frequency conflicts with other stations, so the following is most likely not 100 per cent accurate:

Transmitter 1
0000-0800z on 7540 kHz, 0800-1000 and 1300-1600z 9870 kHz, 1600-0000z on 13,615 kHz.

Transmitter 2
0000-0400z 9410 kHz, 0400-0800z 9350 kHz, 0800-1000z 9985 kHz, 1300-2000z 21,610 kHz, 2000-2200z 11,970 kHz and 2200-0000z on 17,760 kHz.

Transmitter 3
0000-0100z 17,890 kHz, 0100-0300z 9985 kHz, 0300-0500z 7520 kHz, 0500-1000z 7465 kHz, 1300-1800z 18,930 kHz (not a typing error!), 1800-2000z 13,710 kHz, 2000-2200z 7540 kHz, 2200-0000z on 5825 kHz.

Transmitter 4
0000-0200z 11,885 kHz, 0200-1000z 5825 kHz, 1300-1700z 11,735 kHz, 1700-2200z 21,735 kHz, 2200-0000z 11,885 kHz.

Note that there are no broadcasts from 1000-1300z, when the technical people no doubt catch up with some shut-eye. English specifically for Australia is from 0800-1000z on 9870 kHz.

This schedule sourced to *Bob German of WEWN*, and made available via *Dan Ferguson's Listener's Notebook*, published by the *North American Shortwave Association.*

Israel

The latest schedule from **Kol Israel** in Jerusalem is to hand, and shows English programming according to the following plan:

0500-0515z 9435 kHz
1100-1130z 17,545 kHz
1400-1425z (Sunday to Thursday) 15,640, 17,575, 11,587, 11,603, 15,650 and 17,590 kHz
1800-1815z 7465, 11,587, 17,575 and 11,675 kHz
2000-2030z 7465, 9435, 11,587, 11,603, 17,575, 11,675 kHz
2230-2300z 7465, 9435, 11,587. 11,603, 17,575 and 11,675 kHz

Relays of the Hebrew language home service, **Reshet Bet** are listed:
0400-2300z on 15,615 and 9388 kHz
0400-0455z and **0530-0610z** on 9435 kHz
0615-1050z and **1205-1355z** on 17,545 kHz.

Main target areas for all broadcasts are Europe and North America.

Publications news

Devotees of the **BBC World Service** (and there are about 30 million of them in the world) will now need to pay quite a bit more for a subscription to the station's monthly program and frequency guide. **BBC Worldwide** is a new publication, which includes the long-established **London Calling**, as well as feature articles, book reviews and a guide to programming on **BBC World Service Television**. The November issue runs to almost 100 pages, glossy format, but for that you'll need to outlay something like $50 Australian per annum. Certainly a worthwhile publication, but at the price, only for frequent BBC listeners.

For further information write to: BBC World Service, PO Box 76S, Bush House, Strand, London, WC2B 4PH, England.

Compiled by Craig Seager
PO Box 782, Goulburn, New South Wales 2580

Reviewed in the November *BBC Worldwide* is a new publication from **BBC Monitoring** known as the **WBI Directory**. The BBC's Monitoring Service at Caversham Park, west of London, listens to domestic and international radio broadcasts from around the world, gathering news which is used by commercial subscribers and BBC newsrooms. It keeps a close eye on developments in international broadcasting and publishes a weekly digest called **World Broadcasting Information**. The WBI Directory supplements the weekly WBI and includes details of international radio and TV stations, based on extensive research and information received direct from the broadcasters themselves. It does not include frequency information, which is the province of WBI, but rather gives details of aims, station personnel, future plans and transmitting facilities.

I'm not sure of pricing on this one, nor have I seen a copy to evaluate its worth, but be prepared to pay well over $100 per annum for a subscription. Further details from: The Marketing Department, BBC Monitoring, Caversham Park, Reading RG4 8TZ, England.

South Africa

Last issue I promised a full schedule for the **BBC**'s usage of the **SABC**'s Meyerton transmitting facility; this version received by *Bill Westenhaver* direct from the *BBC World Service*:

0300-0330z Swahili 11,845 kHz
0430-0445z Portuguese 9515, 11,940, 6175 kHz
0530-0545z Portuguese 9515, 15,105, 6005 kHz
0700-0730z English 17,790 kHz
1700-1715z Portuguese 9515, 7230, 6070 kHz
1700-1900z English 15,420 kHz
1745-1800z Swahili 7230 kHz

Some caution is advised when claiming reception of the South African relay, as some of these frequencies are listed for other BBC transmitter sites, simultaneously.

Belgium

Radio Vlaanderen International — the new name for Belgium's **BRT** — advises this schedule for English broadcasts, effective until March 27, 1993:

0730-0800z 5900 and 9905 kHz for Europe, 11,695 kHz to Australia
1000-1030z (weekdays) 5900 and 9905 kHz to Europe
1230-1300z (Sundays) 21,810 kHz to North America, 17,545 kHz to Africa and 13,675 kHz to Europe
1400-1430z (weekdays) 21,810 kHz to North America and 17,550 kHz to South East Asia
1900-1930z 5900 kHz for Europe and 15,540 kHz to Africa
2200-2230z 5900 and 9905 kHz to Europe
0030-0100z 9930 kHz to Nth America and 13,655 kHz for Sth America

On Saturdays there is a special transmission for Belgian troops taking part in the UN peace-keeping forces in Yugoslavia, 1800-1900z on 9905 kHz in Dutch and French.

Transmitter power is 100 kW, except for African beams, which are 250 kW.

Russian update

Time for our usual swag of Russian news, starting with some timely items from ARDXC member *Nikolai Rudnev* of Stroitel in Russia.

- **Radio Vez Irkutsk** (All Irkutsk) is a new independent station broadcasting from, as one might expect, the city of Irkutsk. This broadcaster is on the air from 2230-2330, 0400-0500 and 1000-1100z on 6090 kHz. Transmitter power is thought to be 50 kW.

- **Radio M** is the new name for the former **Radio Divizhenye** and is on air 0600-0700z (Tuesday to Saturday) on 6200 kHz and 1230-1330z (Tuesday, Wednesday and Friday) on 6220 kHz.

- **Radio N/Radio Nera** is on from 0500-0600z and 0700-1000z (Tuesday to Saturday) on 6200 kHz. Both Radio M and Radio N share the same 50 kW transmitter in Ekaterinburg.

- A new Russian pirate station is **VBWS**, based in Moscow. The reported schedule is: 1300z on 7365 kHz (Monday, Wednesday and Friday), 1830z on 7520 kHz (Tuesday, Thursday and Saturday), 1800-2100z on 7520 kHz (Sunday). Power is said to be 50 to 100 watts and the station plans to broadcast in Russian, English, German, Latvian and Esperanto. The address is: PO Box 35, Moscow, 1115516.

- According to **Radio Japan**'s *Media Roundup* segment, **Radio Pamyat**, the right-wing extremist station, now only has one broadcast (one broadcast too many, some would argue), from 1430-1600z daily on 7230 kHz.

Liberian confusion

It seems that there are now *two* stations claiming to be Liberia's official voice, both calling themselves **ELBC**.

The first, reported in these pages on more than one occasion, operates on 7275 kHz from 0700z sign-on. It is operated by ECOMOG (Economic Community of West African States Cease-Fire Monitoring Group), and speculated transmitter sites have ranged from the Liberian Capital, Monrovia to somewhere in nearby Sierra Leone.

BBC Monitoring now reports that *another* **ELBC** has appeared, using frequencies used in the past by the official government station. The station is in Ggbarnga and is controlled by Charles Taylor's National Patriotic Front of Liberia.

The announced schedule is 0600-0800 and 1745-0000z on 3255 kHz, and 0800-1745z on 6090 kHz. Programming is in French, with some newscasts in local languages. Both 3255 and 6090 kHz were heard on occasion from Australia prior to the outbreak of civil war in Liberia, back in 1990. This war also brought about the demise of the *Voice of America*'s West African relay, located in Monrovia.

News briefs

Our usual roundup of loggings and snippets of information, from various sources:

- Stretching the outer reaches of the 49 metre band that little bit further is **Christian Science** station **WCSN** in Maine, which has appeared on 5850 kHz from 0600-0800z, a late change from its published W92 period schedule. I believe that sister station, **WSHB**, is also using this channel prior to 0600z. It is probably coincidental that the new **WEWN** has announced that nearby 5825 kHz is one of the first frequencies that it will test.

- The Vietnamese regional station at **Lao Cai** has been hovering around the new frequency of 5580 kHz (nominally 5600 kHz) in recent weeks. There is a relay of the central station in Hanoi commencing at 1230z.

• *Glenn Hauser* reports on his *World of Radio* segment that **WWCR** in Nashville has decided to order a third shortwave transmitter — like the original two, a Harris 100 kW unit. It will take four to six months to get the transmitter on air and it may use a 9 MHz channel, or alternatively the station will consider reactivating 12,160 kHz. There is a possibility of a fourth transmitter in the not too distant future — an official at WWCR has indicated that space on the premises will not be a problem.

• A report in *Fine Tuning* indicates that N'Djamena, Chad has been heard on 6165 kHz, closing at 2200z. A bit difficult here due to Switzerland co-channel, but worth further checking.

• **Radio Sofia** in Bulgaria is now observed on out-of-band 6235 kHz for several services, including English at 1915z. This area of the spectrum is becoming quite congested, despite the fact that it is within the marine band! Witness **HCJB**, now on 6205 kHz for morning services to Europe, including at 0730z in English, and **European Christian Radio**, Ravenna Italy, widely heard on 6220 kHz at 1900z.

• **Spanish Foreign Radio**'s Costa Rica relay is providing good reception on 21,460 kHz from 2300z. A comprehensive schedule for the relay facility has so far proved elusive, and usage seems to change from day to day.

• *John Adams* of Seaford, Victoria tells me that he is hearing the Peruvian **Radio Concordia** on 6142 kHz, just up from **Perth** 6140 kHz, with reception at 1000z.

• The **Voice of America** is providing reliable reception on 13,710 kHz during our local morning period, around 1930z. According to *Passport to World Band Radio*, this frequency comes from the Botswana relay base.

• **Radio Baghdad** continues to be heard regularly; *Rumen Pankov* in Bulgaria notes the Arabic service from 2000-2100z on 13,680 and 15,210 kHz, and again from 0900-1000z on 17,720 and 17,740 kHz. English is reported on 11,860 kHz at 0345z.

• The **Vatican Radio** has been observed by *Bob Padula* of Melbourne on the new frequency of 7360 kHz, in Arabic from 1910z sign-on. Strangely, the Vatican is also on adjacent 7365 kHz at the same time, in European languages.

• Also from *Bob Padula*, we have an interesting logging of **Radio Belgrade** on 7200 kHz with its domestic service, heard with Serbian news reports at 0645z. In the same region, *BBC Monitoring* has been hearing **Radio Bosnia Herzegovina** on 7238 kHz USB at various times of the day. Again, this is a domestic service relay, with programming produced in the Sarajevo studios.

Mid-summer DX

If you tire of the traditional outdoor pursuits this summer, there's always the shortwave bands, and the hotter months bring some interesting reception phenomena, not noted at other spots on the calendar. In particular, the midday period heralds what has come to be known as the *Midday Asian Mode*, wherein signals from Asia suddenly become audible on the lower frequencies, including the 49, 41 and 31 metre bands. Actually, this is a bit of a misnomer, as stations in Africa can also appear on occasion. The period to check is from 0000-0300z, but don't expect to strike gold on your first attempt — only a few days of the year are conducive to the mode at its best. Broadcasters heard in the past include those located in Indonesia, Malaysia, Singapore, Japan, Nepal, Mauritius, Angola and the Seychelles.

There appears to be some correlation between the occurrence of the mode and low sunspot activity, so with the cycle now trending downwards there is every chance that this year may bring some interesting catches!

Somewhat easier to explain is the enhanced and later reception of signals from Europe on the lower bands in our afternoon/early evening period. Later sunrise in Europe means that the long-route track is open on such bands as 49 metres until 0930z or later. Again in low sunspot years, European signals on 75 metres have been heard until a similar hour, and the same principles apply to stations in the Middle East and Africa. *Australian Radio DX Club* members are participating in a survey over the summer months of long path European reception to gauge the trends, and we'll let you know the results in due course.

Lastly, the medium wave band can often become a treasure trove of signals, if one has an efficient antenna system, and a favorable listening location. North American stations are at their best, often until after 1300z, at least in the eastern states. People in the west don't miss out, though, and European stations are all the rage in the early morning, for all areas, 1800-2000z.

Marker stations include Daman, Saudi Arabia on 1440 kHz and the West German outlet at Langenburg on 1593 kHz. The New Zealand station co-channel won't cause any problems, due to the early sunrise at the transmitting location.

France

A new schedule has appeared on the computer bulletin boards for Radio France International, and has found its way to me via Patrick McDonald's Shortwave Possums BBS in Sydney.

English is listed three times daily:

1230-1300z 15,365 and 21,465 kHz
1400-1500z 17,650, 11,910 and 15,405 kHz
1600-1700z 11,705, 17,620, 17,795, 17,850, 15,530, 12,015 kHz

Vietnamese goes out from 1430-1600z on 9650 and 15,215 kHz (via the Japanese relay), and Chinese from 0930-1030z on 11,715 and 15,215 kHz, and again 1200-1300z on 9650 kHz (all via Japan).

Japan

Radio Japan introduced a new schedule on November 1, which shows English broadcasts as follows:

Regional Service

0300-0330z 21,610 and 17,825 kHz to North America and 15,325 kHz for Central America

0900-1000z 15,270 and 17,860 kHz to Australia

General Service

0100-0200z 17,810, 15,195, 17,835, 17,845 and 11,840 kHz all to Asia

0300-0400z 17,810 for Asia, 5960 and 15,230 kHz to North America

0500-0600z 17,810, 17,765, 21,610 to Asia, 15,230, 17,825 for North America, 17,860, 7230 and 6085 kHz to Europe

0700-0800z 17,810, 17,765 to Asia, 17,860 to Australia, 5970 and 6025 kHz to Europe

0900-1000z 21,610, 11,840, 11,815 kHz to Asia

1100-1200z 11,840, 11,815 to Asia, 6120 kHz to North America

1400-1500z 9535, 11,815 kHz to Asia/North America

1500-1600z 9535 to North America, 15,355 kHz to Africa

1700-1800z 7140, 11,815 for Asia, 9535 to North America, 17,775 kHz to the Middle East

1900-1930z 9535 to North America, 9640, 11,850 kHz to Australia

2100-2200z 17,810, 11,840, 15,430, 11,815 for Asia, 17,890 to Australia, 11,925 kHz for Europe

2300-0000z 17,810, 15,430, 15,195 to Asia, 6050 and 6125 kHz for listeners in Europe

The *Media Roundup* segment for shortwave enthusiasts goes out on Sundays at 0330, 0930, 1530 and 2130z.

Guam

Adventist World Radio Asia now appears to have recovered from the devastation of Typhoon Omar, with both transmitters now back on line. The typhoon, which struck on August 28, kept AWR Asia off the air for three weeks, until broadcasts resumed using one transmitter on September 20.

The list of damaged items included numerous ceramic insulators, transmission lines for two antennas, and electrical damage to the computerised antenna and slew switch controller, which changes the broadcast signal direction.

In addition to antenna damage, the high voltage transformers for both 100 kW transmitters were damaged during power testing a week after the typhoon, caused by excessive moisture build-up which resulted in arcing. The station's 750 kW emergency generator powered the operation until mains power was restored on September 22.

The estimated cost to repair all the damage amounted to about US $90,000, according to program director *Greg Scott*. AWR Asia normally broadcasts in 19 languages, but with the limitation of only one transmitter at a time, most languages were off the air.

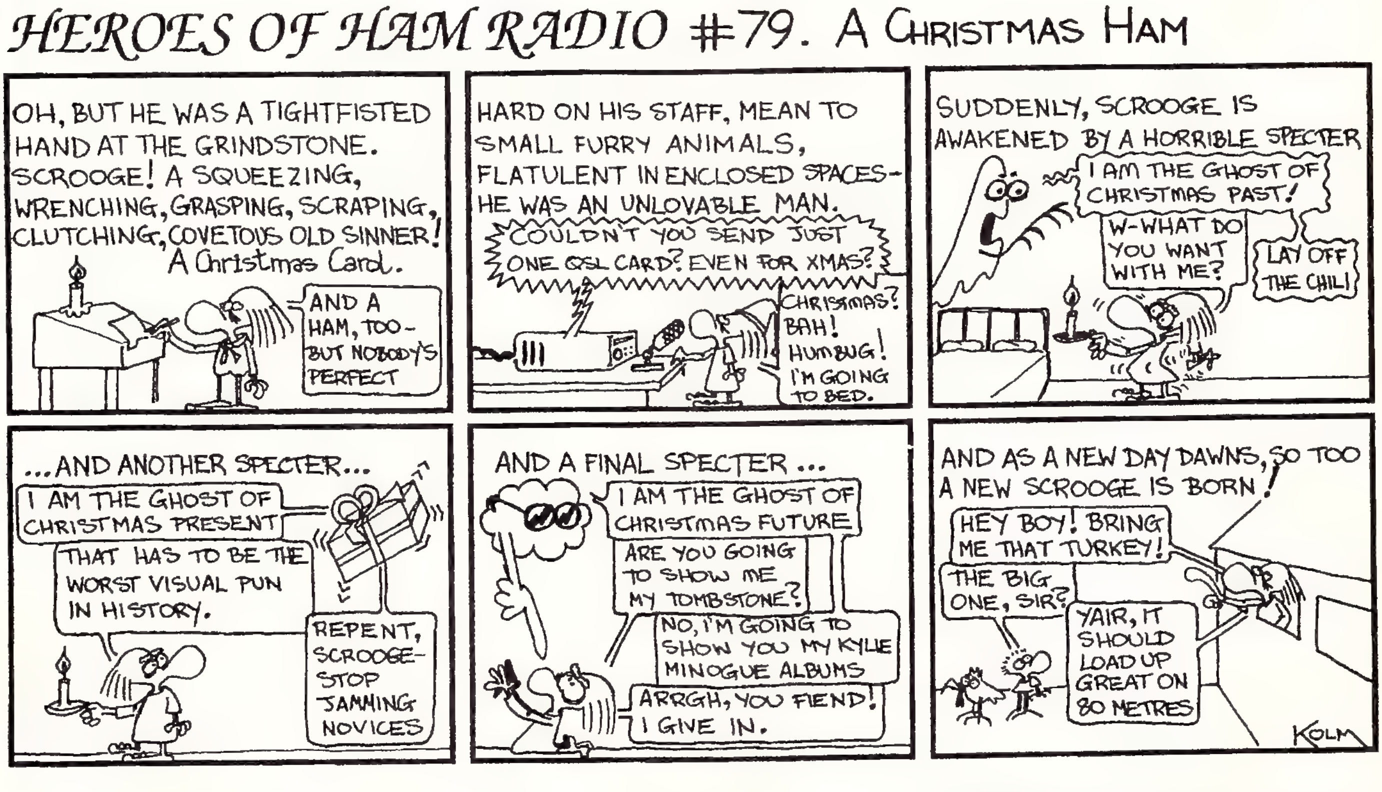
The *DX Asiawaves* program, compiled by ARDXC members, was suspended for a short period, but is now back five times weekly. Look for it at 0215z Sundays on 13,720 kHz, 1615z Saturdays and Sundays on 11,980 kHz, 1815 Sundays on 13,720 kHz and 2315z Saturdays on 15,610 kHz.

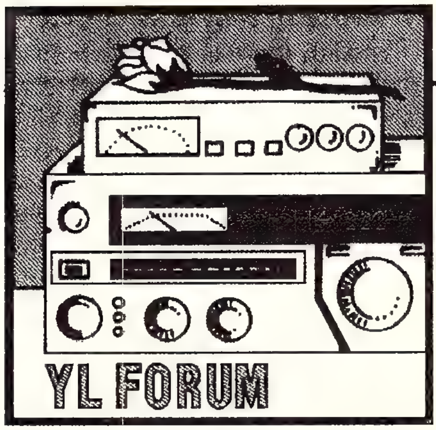
BBC ON FM...

Those of you who like listening to the BBC can now hear it via an encrypted sub-carrier system on selected FM radio stations. We'll tell you more about this development next month.

Amateur Radio Action's Shortwave Notes are compiled by Craig Seager from information gathered from many sources, including members of the **Australian Radio DX Club Inc.**

To receive information about the hobby of broadcast DXing and SWLing, details about the ARDXC and its member activities, and a sample copy of the club's monthly newsletter 'Australian DX News', please write to: Australian Radio DX Club Inc., 258 Dandelion Drive, Rowville, Vic 3178. Please enclose six 45¢ stamps — and don't forget to mention that you read about the club in **Amateur Radio Action**!


HEROES OF HAM RADIO #79. A CHRISTMAS HAM
OH, BUT HE WAS A TIGHTFISTED HAND AT THE GRINDSTONE. SCROOGE! A SQUEEZING, WRENCHING, GRASPING, SCRAPING, CLUTCHING, COVETOUS OLD SINNER! A Christmas Carol.
AND A HAM, TOO - BUT NOBODY'S PERFECT
HARD ON HIS STAFF, MEAN TO SMALL FURRY ANIMALS, FLATULENT IN ENCLOSED SPACES - HE WAS AN UNLOVABLE MAN.
COULDN'T YOU SEND JUST ONE QSL CARD? EVEN FOR XMAS?
CHRISTMAS? BAH! HUMBUG! I'M GOING TO BED.
SUDDENLY, SCROOGE IS AWAKENED BY A HORRIBLE SPECTER
I AM THE GHOST OF CHRISTMAS PAST!
W-WHAT DO YOU WANT WITH ME?
LAY OFF THE CHILI
...AND ANOTHER SPECTER...
I AM THE GHOST OF CHRISTMAS PRESENT
THAT HAS TO BE THE WORST VISUAL PUN IN HISTORY.
REPENT, SCROOGE - STOP JAMMING NOVICES
AND A FINAL SPECTER ...
I AM THE GHOST OF CHRISTMAS FUTURE
ARE YOU GOING TO SHOW ME MY TOMBSTONE?
NO, I'M GOING TO SHOW YOU MY KYLIE MINOGUE ALBUMS
ARRGH, YOU FIEND! I GIVE IN.
AND AS A NEW DAY DAWNS, SO TOO A NEW SCROOGE IS BORN!
HEY BOY! BRING ME THAT TURKEY!
THE BIG ONE, SIR?
YAIR, IT SHOULD LOAD UP GREAT ON 80 METRES
KOLM



Welcome to Willis Island Population 4 — plus 3...

The thing that separates a 'Grumman Widgeon' plane from other amphibious aeroplanes I have travelled on — apart from its size — is that it lands on its belly. The old 'Norseman', landing on calm Norwegian fjords, had large floats underneath. The 'Widgeon', however, landing on its belly in an 18 knot wind in the South Pacific swell, lived up to its reputation as a cross between an aeroplane and a submarine, bouncing along and *into* the waves, before coming to rest in the Willis Island lagoon.

We had spotted Willis Island only minutes earlier. Roughly 12 acres of sand in the vast Pacific Ocean does not loom on the horizon to any great degree. John, our pilot, who had found the island by dead reckoning on previous occasions, had recently installed a satellite navigator on board his plane. Interestingly, this showed the island to actually be a couple of miles off its 'official' position! The error was no worse than that we could 'eyeball' our way to the correct location and before long the Grumman was practically on the beach where the island's entire population of four was waiting to meet us and give a hand with unloading.

It has been said that one can *smell* Willis Island before one sees it, due to the multitudes of sea birds nesting there. This may be so, but after a short time the pong is less noticeable and a couple of hours later it had disappeared completely as far as anyone ashore was concerned. The birds have no fear of man and prefer to roost within the 'settlement'. We therefore looked in wonder at boobies roosting and nesting precariously on swaying coconut palm fronds and on the limbs of other trees growing in the 'yard'. The 'yard' takes up most of the island with a surrounding rim being used by sooty terns and other smaller birds. These seem to spend their time literally waiting for the balloon to go up. When it — the weather balloon — *does* go up each morning, the birds rise with it, screeching hysterically for several minutes before settling down to wait for the next one. As this program has been running for several decades and through several generations of birds, one must assume that they are more excited than actually frightened. It probably is their way of going for a ride on the big dipper.

The first party of 'settlers' arrived on Willis Island on October 14, 1921. This tiny speck of Australian territory had been selected as a suitable site for a costal radio station which could also provide cyclone warnings for mainland Australia. By October 26 that year the wireless hut had been completed, and the first radio message to be transmitted from Willis Island to Australia was sent on November 1 by one John K Davis.

"Work of erection of Willis Island station proceeding satisfactorily," the message read. "The job has proved a heavier one than anticipated. All hands are in good health and it is hoped, if the weather continues fine, to dispatch the 'Innisfail' from here on Monday evening, November 7. Work then remaining can be completed by resident party — Davis."

The administration of Willis Island has long since been taken over by the Australian Bureau of Meteorology, but October 14, 1921 can reasonably be considered to be Willis Island's Foundation Day. 71 years later, during a barbecue dinner, we raised our glasses in memory of this occasion, although forgotten by Queen and country, neither of whom sent appropriate greetings.

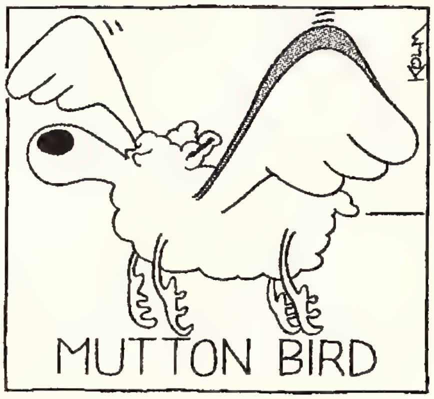
As radio amateurs we did not have much time to socialise. However, we shared the main meal of the day with the 'islanders'. Otherwise our one-week stay on the island passed in a blur; operate, grab a bite to eat or a cup of coffee, snatch a couple of hours sleep and then back to operating.

Sleeping became rather entertaining for me due to some unforeseen wildlife. Shortly after dusk the mutton birds would return from the sea. All night through their ghost-like long wails, sobs and cries were heard above all other bird noises. Trying to sleep, I gained the impression that they lived underground, giving way to dreams of 'little people' gnomes, goblins and the like. It was therefore hard to instantly adjust my brain to a 1992 amateur radio pile-up when I woke up. It would invariably take a few minutes to get my brain ticking over and the CW hand in motion. Willis Island has had many resident amateurs over the years and many DXpeditions have stopped by for a few days operating after a Mellish Reef stint. Still, the fact remained that, in Europe, Willis Island still rated No 37 on the 'most wanted' list. It was also still badly-needed on CW and on the WARC bands. We three operators did our best to satisfy this demand. We had two stations on the air almost round the clock. **Atsu, VK2BEX** operated one station while Jim and I shared the other one.

A developing blister on my CW thumb and the paddle developing a longish gap from excessive use sometimes made it hard for me to get back into the swing of things after a rest. The keyer often seemed to take on a life of its own, sending off gibberish until tamed by a concentrated effort on my part, pushing aside goblins and gnomes in the process.

A daytime break would offer a spot of sight-seeing. The scenery on Willis Island does not offer much variety and a walk around the entire periphery is done in half an hour, stopping to pick shells, look at birds, poke around in rock pools and so on on the way. For good measure I would take in the chook-run as well on my daily constitutional, and one day I went to see the archaeological digs.

On browsing through some old papers Geoff, the technician, had come



By Kirsti Jenkins-Smith, VK9NL
PO Box 90, Norfolk Island, South Pacific 2899

across a reference to a concrete slab. Apparently back in the '20s, someone had decided to construct a concrete tennis court. Geoff went to look for it, and soon found a corner of concrete protruding from the sand. He set to work and uncovered several metres of the slab which had been undermined by Mutton birds and was in a rather crumbly condition. It was probably too late to resurrect it for a tennis court but the humus which had collected on top of it was perfect compost which could be used on the vegetable garden. Cherry tomatoes on plants over six feet tall grew in profusion in a sheltered spot between the buildings and, underneath, other vegetable plants were thriving.

Fresh vegetables and fruit is highly treasured in a place like Willis Island. The island is otherwise not lacking in anything, even fresh water which is produced by a desalination plant. Even so, four people living together for a six-month stretch on an island this size cannot always have been easy. On the utmost northern point of the island, four lonely pegs stick up out of the sand. True or not, they are said to be the remains of a hut built by someone who just wanted to be alone — escaping the 'crowd' to a distance of about 100 metres.

Standing on the 26 feet summit of the island, looking at the sea stretching away in all directions, gives a true realisation of the size of the island and the achievement of having kept this place manned and in working order for 71 years.

In 1927 Eric Reithmiller reported on the radio equipment of the day: a rotary 1500 watt spark transmitter operating on 500 kHz and 300 kHz with a three or five horsepower petrol engine and a 110 volt DC generator.

The generator was so noisy that it had to be switched off in order to receive, and the operator could be seen dashing in and out of the engine room to start or switch off the generator depending on whether he was about to send or receive.

Short wave was introduced in 1928, with the station then transmitting on 32 metres. Even with this improvement the equipment of those days had a long way to go to reach even the development of the amateur radio equipment we were at present using — digital frequency readout, phase-locked loop, filters, automatic tuners... all that stuff. And in those days, even more than now, the men had to be versatile. Goats had been introduced to the island, but when these proved to be unsuccessful due to the fishy flavor of the milk, the radio man was issued a gun and ordered to shoot 30 goats before returning the gun on the next ship.

To while away the long evenings short wave listening became popular and in the mid-'30s one Arthur Oliver wrote letters to his wife, which were transmitted in Morse Code by the operator, then transcribed and posted in Australia. Arthur Oliver also kept in touch with his neighbor Allan Williams, an amateur radio operator in Sydney. Once a week he was able to exchange greetings with his wife in Morse Code which Mrs Oliver had studied and learned for that purpose.

Communications have progressed since those days. Today fax and direct telephone keeps the men in touch with those at home. The data from the weather balloon is received by computer and the men can keep up with world events by satellite TV. And, from time to time, a resident amateur radio operator will be in their midst.

Our own stay came to an end all too quickly, although after 18,000 QSOs the strain was beginning to catch up with us. Still, if the weather had been too windy for the plane to land, we would not have objected to a few days' more operating.

But the scheduled day of departure proved fine and calm as we packed our gear and wheeled it all down to the beach. Soon the Grumman Widgeon came winging in overhead and we watched it belly flop in the distance and start to taxi in to shore.

This was it!

Leaving behind our new-found friends John, John, Geoff and Greg, leaving behind the gleaming sands, the screeching birds and even the gnomes and goblins, we waded into the water and crawled aboard the Grumman. Soon we were airborne, frantically snapping some last photos of Willis Island. Two hours' flight ahead was Cairns. Below was the blue Pacific Ocean. Willis Island had already disappeared from view.

We slept.

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Contest Diary

26 Dec - 17 Jan	Ross Hull Memorial VHF-UHF Contest
2-3 January '93	ARRL RTTY Roundup
29-31 January '93	CQ World Wide 160 metre DX Contest (CW)

Coming Up

CQ WW 160m Contest (SSB)
French Contest
Belgian Contest
ARRL DX (CW)

Ross Hull Memorial VHF-UHF Contest 1992-1993

Introduction

The contest period covers three full weeks and four weekends, beginning on Saturday 26 December 1992 and running until Sunday 17 January 1993. Due to a lack of complaints (!) the WIA has seen fit to make no major rule changes. The 1800z start for each 'day' has been retained, so that contest days will correspond to local days. The date can be either UTC or local (in UTC, the contest starts 25/26 December, but using local dates this would be 26/27). Either is acceptable — just mark the date column in your log 'UTC' or 'local'. However all times must be in UTC.

Similar to last year it has been requested that contestants keep the DX calling frequencies clear as many DX contacts were missed — especially on two and six metres. If you make a contact on the call frequency please move somewhere else to chat or exchange contest numbers. It is also suggested that a frequency of x.150 on each band be for contest working — further up the band better still.

Logs from stations heard exchanging numbers on 50.110 MHz will not be accepted, the ideal frequency being 50.150 MHz or above — better still, 52 MHz would be perfect.

Rules

1) **Sections**: A: Multiband, B: Single band. All entrants will be scored for both Section A and Section B.

2) **Contest Exchange**: RS(T) numbers plus a three-digit serial number. Serial numbers may be cumulative or begin again at 001 at the start of each contest day. Maidenhead locator numbers may be exchanged as an aid to distance scoring.

3) **Scoring**: One point per 100 km or part thereof (ie up to 99 km: 1 point, 100 — 199 km: 2 points and so on). On six metres as above but up to a maximum of 10 points per contact.

Scoring will be based on the seven best contest days (1800 to 1800z) on each band, as nominated by the entrant. The seven scoring days may be different for each band.

4) **Band Multipliers**: six metres: 1; two metres: 4; 70cm: seven; 23cm: 10; 2.4 GHz: 13; higher: 16.

5) **Logs**: Logs should cover the full contest period. Distance estimates need only be made for the seven chosen days on each band. Separate logs for each band would help, or alternatively common logs with separate score columns for each band.

Logs must contain the following for each contact:

- Date (UTC or Local) and UTC time.
- Station location if operating portable.
- Call sign of station worked.
- Location or maidenhead locater of station worked (if not QTHR).
- Reports and serial numbers sent and received.
- Estimated distance worked and points claimed. (The contest manager reserves the right to correct distance estimates on the basis of computer calculation, and his decision will be accepted as final).

6) **Cover Sheet**: Logs must be supplied with a cover sheet containing:

- Operator's callsign, name and address.
- Station location (if different from postal address).
- A score table set out to show dates down the left side and bands across the top, with the scores at intersecting points.
- A signed declaration that the station has been operated in accordance with the rules and spirit of the contest.

7) **Disqualification**: The normal rules apply. Entrants may be disqualified if there is evidence that claimed contacts were not made, or if logs are incomplete or illegible. Persistent use of DX calling frequencies for the contest exchanges may lead to scoring penalties.

8) **Awards**: The overall winner will be the top scorer in Section A. Awards will also be made to the top scorers on each of the following bands: six metres; two metres; 70cm; 23cm; 13cm; microwaves (above 3 GHz).

ARRL RTTY Roundup

1) **Object**: Contact and exchange information with as many stations as possible on digital modes. Any station may work any other station.

2) **Contest period**: Contest begins 1800z Saturday January 2, 1993 and concludes 2400z Sunday. Operate no more than 24 hours. Two rest periods (for a combined total of six hours) must be taken in two single blocks of time, clearly marked in the log.

3) **Modes**: Baudot RTTY, ASCII, Amtor and Packet (attended operation only).

4) **Bands**: All amateur bands from 3.5 to 30 MHz (excluding 10, 18 and 24 MHz).

5) **Entry categories**:

A) Single Operator, multi band: one person performs all operating and logging functions. Use of spotting nets (operating arrangements involving assistance through DX-alerting nets) is not permitted. Single operator stations are allowed only one transmitted signal at any given time.

1) Less than 150 watts output.
2) More than 150 watts output.

B) Multi-operator, single transmitter only: more than one person operates, checks for duplicates, keeps the log, and so on. Once the station has begun operation on a given band for at least 10 minutes, listening time counts as operating time. Multi-operator stations are allowed only one transmitted signal at any given time.

6) **Exchange**:

United States: Signal report and state.
Canada: Signal report and province.
DX (including VK!): Signal report and serial number (starting with 001).
Note: Both stations must receive and acknowledge the complete exchange for the contact to count.

7) **Scoring**:

By James Spenceley, VK2AUP
5 Muraban Place, Belrose, New South Wales 2085

A) QSO points: Count one point for each completed contact (anyone can work anyone). A station may be worked once per band for QSO credit (but not for additional multipliers).

B) Multiplier: Count only once (not once per band), each US state (except KH6 and KL7), each VE province (plus VE8 and YV1) and each DXCC country. KH6 and KL7 count as separate DXCC countries. The US or Canada do not count as DXCC countries.

8) **Miscellaneous**:

A) Cross-band and cross-mode contacts are not permitted. Packet radio contacts made through digipeaters or gateways are not permitted.

B) The use of non-amateur radio means of communications (for example telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of the competition.

9) **Reporting**:

A) Entries must be postmarked no later than 30 days after the end of the contest. Any entry making more than 200 total QSOs must submit duplicate check sheets (an alphabetical listing of stations worked). No late entries can be accepted. Use *ARRL RTTY Roundup* forms, a reasonable facsimile or submit entries on computer diskette.

1) Official entry forms are available from ARRL HQ for an SASE with two IRCs to cover postage.

2) You may submit your entry on floppy disk in lieu of paper logs. The floppy disk must be IBM-compatible, MS-DOS formatted, either 3.5 or 5.25 inch (40 or 80 track). The log information must be in an ASCII file containing all log exchange information (band, mode, date, on and off times, time in UTC (z), call of station worked, exchange sent, exchange received, multipliers — marked first time worked — and QSO points). One entry per disk. An official summary sheet or reasonable facsimile with a signed contest participation disclaimer is required with all entries.

10) **Awards**: Distinctive certificates will be awarded to: Top high power and low power Single-operator and Multi-operator scorers in each ARRL/CRRL Section; Top high and low power Single-operator and Multi-operator scorers in each DXCC country (other than W/VE); each Novice and Technician entrant; each entrant making at least 50 QSOs.

11) **Conditions of Entry**: Each entrant agrees to be bound by the provisions as well as the spirit of the rules of competition, the regulations of his/her licensing authority and the decisions of the ARRL Awards Committee.

12) **Disqualification**: An entry may be disqualified if the overall score is reduced by more than two per cent. Score reduction does not include correction of arithmetic errors. Reductions may be made of unconfirmed QSOs or multipliers, duplicate QSOs or other scoring discrepancies. Any entry will be disqualified if more than two per cent duplicate contacts are claimed for credit. For each duplicate or miscopied call sign removed from the log by ARRL, three additional QSOs will be deleted as a penalty. The penalty will not be considered as part of the two per cent disqualification criterion. If a participant is disqualified, that operator will be barred from entering the contest on that mode next year. The calls of all disqualified participants will be listed in the QST contest results.

The 1993 CQ World-Wide 160 Metre DX Contest

1) **CW Contest** begins Friday, January 29, 1993 at 2200z and concludes Sunday, January 31, 1993 at 1600z.

2) **Classes**: single and multi-operator (use of packet, a spotting net, or a logging assistant makes you multi-op. Use of computer does not.) Multi-ops must show who was operating for each QSO.

3) **Exchange**: RS(T) and state for USA, area for Canada. DX stations send the prefix, or a country abbreviation. It's good insurance for those prefixes like OK/DK, OL/DL which are often confused. Stations omitting this information for non-multiplier QSOs will not receive credit for them.

4) **Scoring**: Contacts with stations in own country, two points.

Contacts with stations in other countries in same continent, five points. Contacts with stations in other continents, 10 points.

Maritime mobile points determined by location.

If you persuade someone not usually on 160 to get on and work you, be sure to mention it in your log so you get credit for the 'rare' call, if he doesn't work several others. Some public-spirited ops such as W2GD have considerably increased participation this way.

4) **Multiplier**: Each US state (48), Canadian area (13), DX country, and maritime mobile. KH6 and KL7 are considered countries, but also states. No one may count USA or Canada as a country multiplier. Canadian areas: VO1, VO2, NB, NS, PE1, VE2, VE3, VE4, VE5, VE6, VE7, NWT, Yukon. ARRL and WAE country lists and WAC boundaries are the standards.

5) **Final Score**: Total QSO points times the sum of all multipliers (State + VE areas + DX countries + Maritime mobiles).

6) **Penalties**: Three additional contacts may be deleted for each unacknowledged duplicate or unverifiable contact removed from the log. A second multiplier may be removed for each one lost by the above action.

7) **Disqualification**: You may be disqualified for violation of your country's amateur radio regulations, unsportsmanlike conduct, or claiming excessive duplicate or false multiplier contacts. If the corrected score without penalties shrinks more than three per cent from that claimed, disqualification will be considered.

8) **Awards**: Certificates to the top scorers in each class for each state, Canadian area and DX country. In close races, also to the runners-up. In addition, a number of plaques have been donated for particular area honors.

9) **Miscellaneous**:

A) Logs: You can obtain CQ sample log and summary sheets from me (with sufficient return postage) or you can make your own, 40 contacts per page, with columns for UTC, exchanges, multiplier and points. Show multiplier and sequential number only the first time it is worked. Please don't write on the back of pages. 'Dupe sheets' are required for logs over 200 contacts. Include a summary sheet with your entry showing the scoring and other essential information. Include a printed name and address and a signed declaration that all rules have been observed.

B) **Deadline**: The deadline for CW is 28 February. The address to send your logs to is CQ 160 metre contest, 76 North Broadway, Hicksville, New York 11801, USA.

Best of luck with all of your contest efforts — and see you next year! 73 de James VK2AUP.

Compiled by Simon Clowes, VK2TSC
7 Lepton Parade, Jewels, New South Wales 2280

Merry Christmas and Happy New Year! I hope you'll enjoy the holiday period. Now that we've got *that* out of the way let's get down to business...

Foxhunting overseas

Beijing will be holding a foxhunting competition in September 1993 for amateurs from all countries. Further details may be obtained from Wal, VK4DO, at PO Box 262, Airlie Beach, Queensland, or by fax on (079) 45 1375. It would be great to see some of our hunters taking part, wouldn't it?

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Anyway, I will try to keep you informed on its progress.

Other news...

Many Field Days (including the recent one at Westlakes Radio Club here in Newcastle) have at least one foxhunt on 40 metres, and while looking for tricks that we could use on the fox (a 40 metre QRP transmitter with a auto-keyer set for 15 wpm) I came across an old circuit in the archives for a simple 40 metre sniffer. I have drawn the circuit below for your perusal.

As you can see it consists of a simple parallel-tuned circuit which is link-coupled to a detector and amplifier. It is obviously bi-directional and of limited sensitivity, but as a sniffer it works well (well it did when I last used one!). I have a slightly modified version which uses a meter in place of or in conjunction with a speaker which sits on top of the main receiver.

If or when this one starts to show a mid-scale reading on the meter (an old S-meter from a scrapped CB) we are fairly close to the fox. Another item involved with 40 metre hunts is my rebuilt RDF Loop (the same one which went deaf at Urunga). With the help and efforts of Dave, VK2DFL, this has now been overhauled and seems to work better (we could at least *hear* the fox on this one!).

At the time of writing we have not put the loop to the 'ultimate test' but hope to report our success (or lack of it) next month along with the details of the new version. Dave and I believe that this loop may also work for 80 and 10 metre hunts too.

Dave informs me that he is working on a simple sniffer for two metres which could be used by clubs to encourage younger people to become involved in our hobby.

Talking of involving the younger generation (now that sounds good coming from *me*—33 years old!), I took the fox transmitter and a couple of diode detector-style sniffers with me to JOTA and ran a few half-hour hunts for the scouts. Who knows — it may have encouraged some of them to become active.

Oops...

Before going on with the more serious side of things I feel it's time for another embarrassing moment (or two) in foxhunting, both of which came from the same hunt at Westlake's recent field days. This hunt was a two-transmitter hunt on two metres (tx1 was a 25 watt Communico/Phillips VHF highband converted, and tx2 the 2.5 watt Kenwood HT (which is now working thanks to Brian, VK2EBC).).

Dave VK2DFL had the Kenwood, and had hidden on a small section of scrub situated between the old and new main roads near the club, and I had the 25w unit hidden under a bridge with the three-element Yagi pointed at the surface of the lake some 50 feet away.

Situation number one occurred when, five minutes into the hunt, a car pulled up only inches away from the small transmitter. Dave's groans of frustration at being located so quickly turned to (very quiet) roars of laughter at the anticipated scenes when he realised that the car contained a young courting couple. Dave could just picture this couple surrounded by 'weird people' carrying all the usual foxhunting regalia. In this case it is probably fortunate that none of the hunters arrived at this time. However, for one reason or another the couple left.

Dave also caused the second 'moment' on this hunt by leaving the transmitter turned on overtime, as agreed by us, as hunters were in the area. After the allotted extra time he stepped from behind a tree (where no one had realised he was standing), thus causing at least one hunter to require new items of clothing, removed a piece of brush from near the above hunter's foot and turned off the transmitter.

Because I don't want to embarrass too many people (well at least not in this column) I won't mention the transmitter located less than 100 metres from the starting point of a pedestrian hunt which remained unlocated—they found the one 900 metres away with the beam pointed straight up which had been hidden in the branches of a large oak tree—or the confusion caused by the foxes who travelled by two different routes to the same location and were thus able to answer many questions concerning things that may have been passed on the way to the site, in the positive. I will add that McDonald's hamburgers are great to eat while watching the hounds search for you. Maybe *next* time Dave will let me hide in the store?!!

Gosford Field Day

Gosford (or should that now be **Wyong) Field Day** will *definitely* run some mobile and pedestrian hunts. Now to be fair I will warn all potential hunters that the two metre hunts will occur on 146.145 MHz (because those are the only crystals I have which actually *work* in the transmitters), while the 40 and/or 10 metre hunts have yet to be decided.

I will also give you notice that I intend to talk the committee into allowing me to run one of the mobile hunts as a **two-band hunt** — except you will not know the second band until you have located the two metre transmitter. At this stage it could be any band from 40 metres to 10 GHz (yes, we *are* working on a fox for that band as well as modifying the defunct radar detectors for sniffers!).

Since the last paragraph was typed I have spoken to a member of the Field Day organisers and the dual-band hunt seems okay. I have also been given the authority to chase prizes for the hunts, so if anyone wishes to donate a suitable prize, please let me know via packet radio (146.775 MHz) or via the phone (this is a hint Chris — how about a subscription?).

(Done. You have no idea how much I'm looking forward to seeing the next Gosford Field Day, particularly with the bright new venue and the addition of the more 'traditional' events. Make sure you look me up there, Simon — if you have time, that is! And remember, that invitation applies to you all. Ed.)

At the same time Dave (who now seems to be my partner in crime) and I have been putting our heads together in order to come up with tricks which just may make the day a little *more* interesting. These will include new modulation oscillators on at least one of the fox transmitters, and timers to turn them off after a pre-set time. Given time, who knows just *what* we may come up with?...

Okay, I close this month with the promise that as soon as I can compile it there will be an index to foxhunting articles and circuits and the like. As I can only include those I know of, you may wish to tell me of any that *you* are aware of.

73 and compliments of the season, and may the new year bring many more hunts in your area. Simon.

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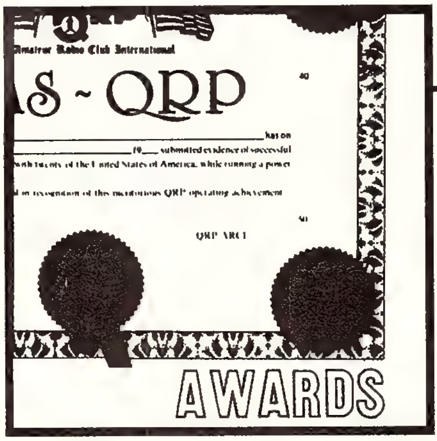

Editor's note

It's been a long time since we regularly presented news about award programs available to amateurs, but our regular contests columnists has offered, so why not...

This column will not be a monthly one by any means — we simply haven't the room — and you'd really have to wonder just how many awards there really are, anyway. But from time to time we'll present details of a new award which may interest you. And now, over to James...

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WIA Awards

For the first month this column is entirely dedicated to WIA awards. The WIA has many awards which are available to members and non-members alike. Applications and inquiries about awards should be addressed to federal awards manager, PO Box 300, Caulfield South, Victoria 3162. All awards are free to WIA members, $5 to VK non-members and US$5 (or 8 IRCs) to all others.

Applications

Applicants should indicate whether they are WIA members and if so should indicate their membership number. If relevant, changes to call sign and dates of such changes should be indicated. If there is a change in QTH of more than 240km, this should also be noted. If portable or mobile operations are involved, the station's locations should be indicated for each such QSO.

Contacts through terrestrial repeaters are not permitted for award purposes, nor are cross-band, mixed-mode or contacts made from aircraft or sea-going vessels.

Where a fee is applicable, this should be sent with the award application.

In cases of dispute, the decision of the federal awards manager and two officers of the federal WIA on the interpretation and application of these rules shall be final and binding. Notwithstanding anything to the contrary in these rules, the WIA federal office reserves the right to amend them when necessary.

Rules

Verification: Applicants must hold unaltered QSL cards for all QSOs. Cards must legibly show time, date, mode, frequency and signal report sent by the station concerned and their location and/or address at the time. Alterations (even if made by the *sender* of the card) will disqualify the card.

Cards should not be sent with award applications. In their place, there should be a list of the cards in call sign order with QSO details listed in columns.

This list should be accompanied by a declaration signed by an official of a society affiliated with the WIA, or by two licensed amateurs, reading as follows: I/we certify that (insert name and call sign of applicant) holds QSL cards corresponding to the above list and that I/we have personally inspected these cards.

Signatories of the declaration should clearly indicate their names, addresses and call signs.

VHF Century Club Award

This is an award issued to any VK or overseas amateur who has proof of contacts with 100 different stations on the VHF bands, at least 70 of which must be VKs. Contacts must have been made on or after June 1, 1948.

Contacts with mobile or portable stations are eligible, however contacts involving terrestrial repeaters, mixed mode or cross-bands are not.

A station claiming for the VHF Century Club must ensure that all contacts were made from the same call area. If an applicant moves QTH all subsequent contacts must be made within a 240km radius of the original QTH, if not a separate application must be made claiming only contacts made from the new QTH.

Worked All VK Call Areas Award (WAVKCA)

Locals need 77 QSOs with the following — VK0: three from at least two different areas; VK1: five on at least two different bands; VK2, VK3, VK4, VK5, VK6 and VK7: 10 each, involving at least three different bands; VK8: five contacts on two different bands; VK9: four QSOs from at least three different areas.

Overseas amateurs need one QSO with stations in each of VK0, VK1, VK8 and VK9, and three in each of VK2, VK3, VK4, VK5, VK6 and VK7, with no requirements as to bands or QTH.

The usual rules (above) apply.

A past provision allowing VK applicants to make repeat contacts with the same stations after 24 hours has been rescinded. No repeat contacts made after February 14, 1990 will count.

Heard All VK Call Areas Award

All the same rules apply for this award as for the WAVKCA award except it is a 'heard only' version available to SWLs. The same requirements apply as for above (locals confirm reception of 77 stations; overseas confirm 22 stations).

By James Spenceley, VK2AUP
5 Muraban Place, Belrose, New South Wales 2085

WIA DXCC Award

This is a certificate issued to amateurs who submit evidence of having worked 100 countries. It can also be endorsed for various modes and bands. Holders are referred to as members of the DX Century Club.

Acceptable countries are determined by the federal awards manager in consultation with the WIA federal office. In practice, the WIA list is the same as that issued by the ARRL, subject to the WIA reserving the right to make variations.

Having obtained the DXCC award, holders may register subsequent claims for higher totals and these will be published from time to time in *Amateur Radio* in the form of a ladder. No stickers to indicate these higher totals on certificates are available.

Having obtained the basic certificate, applicants for recognition of higher totals should be made in multiples of 25 up to a total of 200 (in other words, exactly 125, 150, 175 and 200) and thereafter in multiples of 10 up to a total of 300 (200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300), after which point applications for additions of single countries are in order.

Should a country be deleted from the DXCC list its members and intending members of DXCC will be credited with such country if the date of contact was made before such deletion. Starting dates for new countries will generally be the same as those announced by the ARRL, with the WIA reserving the right to different decisions.

All claimed QSOs must be made from the same DXCC country, however a shift of call prefixes (VK2 to VK4) is permissible but not from VK2 to VK9.

Worked All States (Australia) Award

This is a VHF/UHF award, and all contacts toward it must be made on six metres or above. To qualify you must hold one QSL from each VK area (1-8 inclusive) making a total of eight verifications. Endorsements for various bands and mode are available.

The same rules apply regardless of whether the applicant is a VK or DX amateur.

WIA Antarctic Award

This is a relatively new award offered by the WIA. It is 'magazine' size and is printed in blue ink. It shows a superimposed picture of the Antarctic with all its regions indicated.

To qualify for this award, applicants must first make confirmed contacts with 10 amateur stations conducting valid operations in Antarctica. The 10 must include stations licensed by at least six different government authorities, and at least one must be a VK0.

Antarctica is defined as the land mass, including islands and permanent ice shelf, below latitude 60 degrees south. (Note: this provision specifically excludes Heard and Macquarie Islands, which are sub-Antarctic due to their latitude.)

There are no other restrictions, but the usual terms on cross-band working and other general provisions apply.

Contacts must have been made after 0001z, February 23, 1988. This date was chosen to mark the 75th anniversary of the first two-way radio exchange between the Antarctic continent and the world outside.

Worked All VK Call Areas (VHF) Award

Requires 22 QSOs on VHF bands as follows: one each from VK0, VK1, VK8 and VK9; three each from VK2, VK3, VK4, VK5, VK6 and VK7.

As usual, contacts via terrestrial repeaters, cross-band and mixed mode do not count.

Before I close this chapter on WIA awards, a note of thanks to the WIA for its co-operation in compiling this listing. If your club or special interest group has its own award and you'd like to see it appear in these pages, please send all the details for qualification and a copy of the award, NEATLY marked 'sample' in the callsign field only.

Until next time (when we will hopefully hear from the RSGB) cheers and merry Christmas to you all from James Spenceley, VK2AUP.

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PACKET RACKET

With all that has been going on around here lately the time has come to put to good use some of the information readers have sent in.

A few years ago I came across a likeable amateur by the name of **Maurie, VK5EA**. Just recently I heard from him again. The silly lad has taken on not only the editorship of 'SAPUG NEWS' for the South Australian Packet Users Group Inc but the chairmanship of that same organisation (what a masochist!). Maurie somehow found the time to send me a load of information on what is happening in VK5 packet land.

Mt Gambier and the south-east

This path seems to have been a long-standing problem for the South Australian packet community. Attempts over a long period to establish a reliable path from Adelaide to Mt Gambier have all proven fruitless. It seems there just aren't enough hills along the coast. Maybe they need to experiment with pelican-based digipeaters along the way!

At this stage the Mt Gambier crew are largely reliant on using the Victorian system to get into Western Victoria and then back to Adelaide from there. Mt Gambier is presently served by the VK5SR BBS system and the VK5RPM digipeater on 147.575MHz.

The Riverland

Shortly after the call from Maurie came another from **Peter, VK5APB**, in Berri. It seems that the BBS being run by **Richard, VK5AET**, from Berri is providing a much appreciated service for the South Australian Riverland and on into Mildura on the VK3 side of the border. This system also operates on 147.575MHz and all indications I have are that it is very popular.

RTTY BBS system

For some time the **VK5TTY** RTTY-to-packet gateway system provided a very useful service for many operators. It seems that it has suffered from some hardware problems but has now been re-commissioned on 144.900MHz and 439.050MHz. TCP/IP services are also available from this system as VK5TTY-1 on the same frequencies, with RTTY access provided on 147.525MHz.

Adelaide itself...

It seems that Adelaide, like every other thriving packet metropolis, is experiencing some capacity limitations on user access frequencies. It seems that 147.575MHz is no less populated in Adelaide than it is in Sydney or Melbourne. To relieve the congestion the Elizabeth Amateur Radio Club has established a new BBS on 144.800MHz which is connected to the Adelaide BBS system on 70cm.

This has helped somewhat, but further relief was needed which has now been found in the SAPUG move to add a new two metre access port on 144.850MHz for the VK5WI BBS system. SAPUG is asking that all metropolitan Adelaide users of the VK5WI system move to this new port to allow outer area users with no direct access more effective utilisation of the 147.575MHz service.

HF Packet

I am often asked what frequencies are in use for packet on the HF bands, particularly by those who are located outside the capital cities or those who are going bush. Well, here is a bit of a run-down:

40 metres: some packet will be found in the segment 7.038 to 7.040MHz.

30 metres: packet activity is welcomed in the segment 10.144 to 10.150MHz. Amongst others you will find the **VK2EHQ**, **VK3BBS** and **VK7GL** systems forwarding traffic here. Most of the forwarding systems are closed access; that is, they will not permit users to connect.

20 metres: this is where most of the activity occurs. It seems that 14.095 to 14.101MHz is used for end-user general activity. Open-access BBS systems and more end-user activity can be found on 2kHz channels from 14.101 to 14.107MHz, while the dedicated mail-forwarding BBS systems can be found between 14.109 and 14.112MHz.

Outback packet users tell me the **VK8BBS** system in Alice Springs is particularly useful, it can be found on 14.109MHz.

15 metres: packet activity will be found between 21.101 and 21.120MHz.

TNCs and mail handling

At the end of this column you will see details of the upgrades now available for the MFJ TNCs which enhance the personal mailbox facilities of this range. It seems that all of the TNC manufacturers are moving towards more highly-capable mailbox systems for their TNCs with the option of some fairly significant memory upgrades as well.

Hopefully this will start to make a difference to the way mail is distributed by the full-service BBS systems, particularly in the busier areas. With the new firmware you can leave just your TNC powered up and the BBS can collect and leave mail for you when it has something in its routine distributions. This method has the potential to relieve a great deal of peak period congestion and move the activity to the off-peak times.

If you have one of the more capable TNCs, or get new firmware that has this capability, you might care to contact your local sysop and see if he can provide a direct forwarding service for you.

MFJ in the news

- MFJ has announced the availability for upgraded firmware for the MFJ1278 multi-mode data controller as well as for the MFJ1270B and MFJ1274 packet controllers.

Mailbox memory expansion has been announced for ALL MFJ controllers. For the MFJ1270B, MFJ1270BT, MFJ1274 and MFJ1274T there is the MFJ47A, for 32K RAM, MFJ47B for 128K RAM and MFJ47C for 512K RAM. These expansion kits include release 1.2.9 of the firmware which is required for the enhanced mailbox operation.

For the MFJ1278 or MFJ1278T you will need the MFJ46A for 32K RAM, MFJ46B for 128K RAM or MFJ46C for 512K RAM. The expansion kits include release 3.6 firmware.

Upgraded firmware, release 1.2.9 for the MFJ1270 and 1274 series, provides support for mailbox memory expansion, separate callsign for mailbox, auto forward and reverse forwarding, MAIL LED operation, remote sysop access,

By John Day, VK3ZJF@VK3BLW
PO Box 281, Oakleigh, Victoria 3168

sysop paging, mailbox C-TEXT and a number of other new features. These upgrades should be available here by the time you read this for around $56 plus handling.

Release 3.6 of the firmware for the MFJ1278 should be available at about the same time and supports the mailbox expansion and the other facilities listed above. It is expected that MFJ1278 owners who have forwarded their upgrade coupons will get their new firmware in December, hopefully in time for Christmas. Owners of MFJ1278s who are not entitled to the free upgrade will be able to purchase the upgrade kit under part number MFJ48 for around $56 at about the same time.

- With the release of firmware version 3.6 for the MFJ1278 we also received notice that MFJ's free firmware upgrade offer has been withdrawn. In a discussion with MFJ they indicated that this offer has been very successful over the years it has been offered, but in recent times the frequency of firmware releases has decreased markedly thus reducing the importance of the upgrade. At the same time the cost of administering the program and dealing with queries has increased enormously.

In the early days of multi-mode data controllers new releases were quite frequent, particularly to sort out bugs and operational problems. Now releases include major new features and very rarely any bug fixes! If bugs *do* appear then dealers will upgrade firmware to affected users as needed, thus reducing the importance of the upgrade offers. MFJ's Ray Novak indicated that their commitment to improvements was as strong as ever, as evidenced by the new firmware recently released.

The last upgrade offered for the MFJ1278 was release 3.4, in December 1990.

- Owners of the Kantronics KAM and other TNCs have had real time clock options available for some time. Now MFJ has released the MFJ43 real-time clock option for all MFJ TNCs, as well as any TAPR TNC-2 or clone-type TNC. This option will maintain the correct time when power is removed from the TNC.

Overseas trends

Much interest recently, particularly in the US, has centred on what is happening in HF digital communications research. Notice that I specifically don't refer to packet...

Recently a series of articles has appeared in QEX (published by the ARRL) discussing the status and future of HF digital communication. This series, by **Ken Wickwire KB1JY**, has explored much of the theory being pursued in the present research efforts in the US.

A considerable amount of work is being done to simulate the operation of HF paths on computers. Why? Well it is a lot simpler and easier to use a simulation to test the performance of something than it is to establish a complete system and test it in real life. Measurements of network performance, based on this research, show us a lot about where the problems exist in our present systems. This the leads the way to the development of newer modulation schemes and protocols to allow for more efficient use of the HF spectrum.

But why worry about HF when satellites are becoming so common? Ah yes, but can you see a satellite *all* of the time, and can you use its communications systems when it fails? Whilst satellites are becoming more and more common they cannot yet, for our amateur purposes, be considered a totally reliable transmission medium. At least if we have good HF systems then we can cover the shortcomings which may exist in the space-based systems we have available to us.

Looking for software?

Yes it's fun isn't it! Recently I cam across a BBS in America which offers a great variety of packet software and also has some nice, fast V.32 modems so that logging on to it doesn't cost a fortune! This system is run by **Howard, WB3FFV**. V.32/V.42/V.42bis/MNP1-5 operation is supported on (410) 661-2475, while V.32bis in addition to the above is available on (410) 661-2598. I've seen the latest version of just about everything here, including NOS for Amiga, Mac, UNIX and Atari-ST, as well as just about every BBS package I have ever heard of.

See you next year. Good tidings until then from VK3ZJF@VK3BLW.

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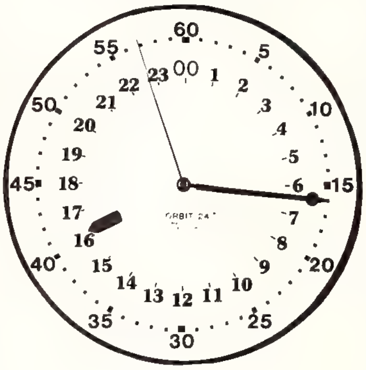

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DX & BAND REPORT

With the weeks slipping along at a fair old rate since our return from Willis Island so too the year 1992 is rapidly coming to an end. My next column, although written in late December, will not hit the news stands until January 1993 so this is a good time to wish all readers a very Happy New Year, not forgetting a repeat of the Seasons Greetings of the last issue.

Looking forward to the coming year, there are going to be many changes in the DXCC Countries List as a number of 'new countries' are added. My own view at the moment is that although all of these 'new' countries will have to be worked and confirmed (to keep on top of the DXCC program), I have no stomach for the chase. In what is perhaps a simplistic sense I have no desire to work many of these areas where the daily or hourly news brings scenes of continual violence and abject misery. The recent appearance of an amateur radio station from a recently over-run area which will count as ......, seems to me to be a travesty of the hobby.

Amateur radio does *so* much in times of national disasters and international good will, but amateur radio and politics do not mix. Recently we have had a couple of examples of amateur radio activity with the "...this should be good for a new DXCC country..." approach. Let's leave amateur radio out of these country-making processes. In due course if such and such an area becomes a sovereign state then DXCC recognition follows as surely as night follows day. It is precisely this sort of meddling in politics which brings the hobby of amateur radio into suspicion in many areas of the world.

Possibly the nicest thing which has happened to me in recent days was a telephone call from Puerto Rico: "Hey Jim, where have you *been*, have not heard you since Willis Island — are you okay?" Anyway, to get to the point we decided to try 10 metres and after a very good QSO, including the inevitable "...did you know that your overseas telephone number has been changed...", we signed off.

In the large pile-up which followed I heard this YL voice. However, to be safe, I said "...go ahead the YL or young person calling me". Sure enough it was a young US operator all right: a young girl and the ripe old age of nine years to boot!

These sort of QSOs are refreshing, and I know that when *I* was nine the idea of amateur radio had never even entered my head. At the immense age of nine this lass already has 97 countries worked — needless to say Norfolk Island was a new one for her.

If in her other QSOs Laura generates the sort of enthusiasm which came across all those miles loud and clear — maybe amateur radio *is* still a force to be reckoned with. It certainly beats the VK activity on 10 MHz SSB with the seemingly-endless discussion about pensions, interest rates, penalty rates and how hardly done-by they were QSO which I listened to the other day. Maybe it is just as well we cannot put an old head on young shoulders...

Silent keys

I was deeply saddened to hear of the passing of **Al, G3FXB** who was very well known in contest and DX areas. Al was very active and a wonderful CW operator, a member of FOC. He will be missed by many of the amateur radio community.

Also **John, TG9VT** passed away a few days ago, (as I write this) and he had been ill for some time. John was a RTTY enthusiast and was always there in the pile-up chasing another new country on that mode. John was a long-term member of H I DX A.

Joel Paladino, N6AMG, also passed away recently after losing his battle with leukemia. Joel was well-known to readers — particularly to six metre operators — for his DX operations from KH8, SW1, VK9L, CN2 and CU3, and for personally financing ZK1CG, FO0CI and VK3SIX. The powerful signal on 50.053 MHz will stand as a memorial to N6AMG.

Thanks Steve, VK3OT, for this item.

Baker & Howland Is KH1

The planned DXpedition to Howland Island is going ahead, and it looks as though activity should start about January 25, 1993. A multi-national team is planned and will meet in Honolulu on January 11, 1993. Departure for **T32, Christmas Island** is scheduled for January 19.

Three stations will be run simultaneously with a possible short operation from Baker Island.

Palmyra/Kingman Reef KH5, KH5K

It is reported that a DXpedition to both KH5, Palmyra and KH5K, Kingman is being planned for February/March 1993. The plan is that 10 operators will activate both areas simultaneously for about eight or nine days. Both of these areas are needed in Europe, with Kingman Reef lying at number four in the European wanted list. **Pete Meyer N0AFW** should be contacted if you have an interest in joining, or donating towards the DXpedition.

Desecheo Island KP5

The DXpedition to Desecheo, scheduled for December 28 to January 4 is still on track. There will be five stations operating on all bands.

QSL Route: **N0TG**
for all KP5 callsigns used.

Chatham Island ZL7

Ron, ZL1AMO has been very active from Chatham Island signing **ZL7AMO**. He was due to go QRT about the end of November.

QSL Route: **ZL1AMO**

Lord Howe Island VK9L

Bill, VK4CRR was recently very active signing **VK9LD** from Lord Howe Island. I received a call from Bill, home after a rough flight back from Lord Howe Island.

They made some 4,800 QSOs with over 2,100 QSOs on CW. QSLing will be fast, with QSL cards courtesy of H I DX A.

QSL Route: **VK4CRR**

Direct only, with SAE and return postage please.

Special calls

VI7AJT was the special callsign being aired from Tasmania in recent weeks to commemorate the discovery

Compiled by Jim Smith, VK9NS

PO Box 90, Norfolk Island, South Pacific 2899

of Van Diemens Land by Abel Tasman some 350 years ago.

Another special call, this time from Canada: **VC350A** is being aired to commemorate the 50th anniversary of the Listowel Squadron of Royal Canadian Air Cadets.

QSL Route for VC350A: **VE3XN**

Chad TT8

Ken, WA4OBO has been quite active signing **TT8ABO** from Chad, and it seems likely that this will be okay at DXCC.

QSL Route: **WA4OBO**

South Georgia VP8

Dorian, VP8CLR is reported active from South Georgia on SSB.

QSL Route:
PO Box 610,
Swansea,
Wales.

CQWW CW contest

By the time you read this the CQWW CW contest will be over and done with for another year. However, it is a great chance to work some of the rarer countries which normally have little CW activity.

If you worked any of the following here are some details.

4M2T	Venezuela via **CT1AHU**
4M5X	Venezuela via **YV5ARV**
4U1VIC	Austria via **DL6RDR**
8P9Z	Barbados via **K4BAI**
FM2GO	Martinique via **FB1MUX**, PO Box 124, F-28113, Luce Cedex, France.
GJ/K2WR	Jersey via **K2WR**
JY8VJ	Jordan via **DL1VJ**
PT0F	Fernando de Narhonha via **AH3C** (get it from 1992 callbook)
T32BE	Christmas Island via **WC5P**
TU4SR	Ivory Coast via **OH8SR**
KC6VV	Belau
KC6SS	Belau via **OKDXA**
D44BC	Cape Verde via **D44BC**
LX/OH2PQ	Luxembourg via **OH2PQ**
P40I	Aruba via **OH2KI**
8R1K	Guyana via **OH0XX**
9M6NA	Labuan Island (IOTA OC-133) via **JE1JKI** or JARL
SV5TS	Dodecanese via **W4PRO**

Iraq YI

It is reported that **Majid**, a well-known operator of **YI1BGD** now has his own callsign **YI1MH.** I haven't heard YI1BGD for *ages...*

Equatorial Guinea 3C

A DXpedition is being planned to Equatorial Guinea for January 1993. It is hoped that this will be a multi-operator affair and all-band operation is promised.

Madagascar 5R8

Activity by two JA stations has been reported from **5R8**, Madagascar: **7K1PGO** signing **5R8DE** and from **JH8JWF** signing **5R8DF.**

QSL Routes: via home calls

Romeo, 3W3RR and QSLing...

Here is an update on the QSL routes for Romeo and his various DX operations. It is hoped that this will solve a few problems:

IS0XV, IS1RR (1990), **3W7A, 3W100HCM, XV100HCM, XV0SU**: all via **W4FRU** or **LZ/3W3RR.**

YA0RR (Dec 1991): via **LZ/3W3RR** (via **JH3DPB** for *JA stations only*).

IS0RR (Sep 1991) via **LZ/3W3RR** (via **W8BLA** for *US stations only*).

XY0RR via **LZ/3W3RR** (via **JA2JPA** for *JA stations only*).

9D0RR (Aug 1992) via **NT2X** (via **LZ/3W3RR** for *CIS stations only*).

NT2X PO Box 755, Brooklyn, New York 11230, USA.

(NB The callbook address for NT2X is also okay.)

EK0RR/AM, EK0RR/MM, 3W3RR etc: all via **LZ/3W3RR.**

AH0M/W1-W8, VE2-3: via W1 QSL bureau.

Note: **RB5IJ** has no connection with any of Romeo's DXpeditions. **UB1RR** is his father, but he has none of Romeo's logs.

He has two postal addresses, either:
PO Box 812,
Sofia 100,
Bulgaria.
or
PO Box 308,
Moscow 103009,
Russia.

Notes: while the Sofia address is now secure many thousands of envelopes were 'lost' through theft in the past. It took the intervention of the director of the Sofia Central Post Office to make this box secure! It is cleared roughly every three months.

Please do not send QSL cards to Romeo's Moscow address since 90 per cent of the mail sent there is opened and subsequently 'lost'. The address is okay for ordinary letters. Romeo then went on to explain that a recent batch of envelopes, some 2,500 in all, was collected from Sofia; these are being actioned as quickly as possible.

It was *always* an impossible situation expecting DXers to QSL to an unknown, unreliable address in Bulgaria and/or Russia. The major issue is that there should have been *no* special cases (eg a JA manager for JA stations or a US manager for US stations). This leaves all DXers in Europe, Oceania, Africa and South America at the mercy of the rapacious postal staff in the Central Post Office, Moscow!

Some months ago, in a long discussion with Romeo, I explained my view that DX QSLing has to be seen to be fair. If a DXer QSLs with his/her SAE and return postage then they have a right to a fair shake.

For future DXpeditions by Romeo there will have to be a fundamental change in QSL routes. For example, he is planning a US address for future DXpeditions, and I agree with him, as this at least should be a 'safe' system. It is certainly a move in the right direction.

DL1VU Pacific trip

Karl, DL1VU plans to start a Pacific trip in the coming months. Here is his proposed itinerary, although we don't have access to the dates as yet.

T32VU Christmas Island via **DJ3TF**
KH5/DL1VU Palmyra Island via **DJ9BC**
T31AF Canton Island via **DL2MDZ**
T30CT Tarawa via **DL1VU**
T33VU Banaba Island via **DL4YAH**

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C21NI Nauru (note below)
V63VU Kosrae via **DB5UJ**
KC6/DI1VU Ponape via **DK5EX**
DU1/DL1VU Manila via **DL1VU**

NB the C21NI arrangements in Nauru have been cancelled. At present there is no licensing on Nauru for visitors. However it is hoped that this matter will be resolved soon.

HA5BUS

It is reported that the **HA5BUS** bus is en route for the USA and that the operators are now also on the way. **EP/HA5BUS** and **S2/HA5BUS** QSL cards are still being mailed from the Globex DX Foundation.

Globex DX Foundation,
PO Box 49,
1311 Budapest,
Hungary.

No *this* and no *that* licence...

Did you know that a proposal was filed this year with the FCC for a '**no *theory***' amateur radio licence? The licence, had it been agreed to, would have given all operating privileges on all amateur radio service frequencies? The basic Morse requirement was set at 5 WPM but this requirement, too, would eventually have been dropped.

At the annual VEC Conference in June, FCC staff pointed out that a 'no theory, no code' license would authorise 'no privileges' to be consistent with the US Communications Act.

The request was denied by the FCC Commission — good thinking!

St Martin FS

Joe, FS/N3NCW has been very active from FS, St Martin on 10, 15, 20 and 40 metres. Joe also came on the 14,222 kHz DX net a few times.

QSL Route: **N3NCW**

Send a SAE and return postage please.

10 metres

This band continues to provide surprises despite the falling sunspot activity. Worked in the last couple of weeks are goodies such as: **4S7EF, S59CNO, A71CH, 9H1EL**, in addition to good openings to the USA.

Mongolia JT

Vlady, UV3HD has been very active signing **JT/UV3HD** on 21 MHz CW.

QSL Route: **DJ2VZ**

So that about wraps things up for this issue and I would like to express my thanks to the many who have kept me informed over the last year of DXing. It has been an exciting year for me with the **Peoples' Republic of Bangladesh** joining the world of amateur radio, and my total completion of the DXCC list on SSB with South Sandwich.

I look forward to 1993 with the possible return to amateur radio by **9G1, Ghana** and hopefully an amateur radio service in place in the **Kingdom of Bhutan**. As stated earlier, numerous additions will be made to the DXCC countries list, and my only hope is that the addition of several countries is also tempered by humanitarian considerations.

In particular, thanks is due to the DX outlets who kindly keep in touch with me, and they too keep the DXers informed, which is the name of the game. To the readers and supporters of this column many thanks, and may 1993 be a good year for you all.

Inside DX, QRZ DX., Les Bacores DX, Long Island DX Bulletin, JA 59 Magazine, JA DX News, RSGB DX Newsletter, DXpress, W6GO/K6HHD Managers List, Lynx DX Bulletin, and more.

73 Jim VK9NS.

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Propagation

ABOUT THESE CHARTS

The data on these pages are graphs showing forecasts for expected HF operating conditions between Australia and a number of important DX destinations. The information they contain is prepared by **IPS Radio and Space Services**, a division of the federal Department of Administrative Services. IPS monitors changing radio conditions — which are affected most greatly by fairly-predictable changes in solar activity — and issues reports and warnings based on that data.

Stations in the eastern half of Australia should refer to the graphs on page 60. The data on page 61 is calculated for stations in the western half of the continent. Of course, if your location is in the middle of the continent try reading them *both*—then make an educated guess...

The horizontal axis of each graph represents the hour of the day expressed in Universal Co-ordinated Time or UTC ('z'). The vertical axis lists specific point frequencies within each HF amateur band.

The maps are easy to read. First go to the map which looks closest to the area in which you are interested. Look *up* from the time and *across* from the selected band to the point at which the two variables merge. Note which symbol — if any — appears at the intersection of the particular time and frequency combination for that area and refer to the legend (right) to find the sort of propagation most likely to apply. If the space is blank the forecast is not good — your time and frequency combination is unlikely to allow communication to the destination station.

East - England (short path)

```
28.5         ..
24.9         ........
21.2        .%%%%%%%%
18.1        .F%%%%%%%.
14.2       AFFFFFFFFF%..
10.1           AAAFFFFF%%%
 7.2               FFFFFFF
 3.6                FFFFF
 1.8                FFFFF
 0.9                FFFFF
 MHZ
 UT 00    06    12    18    24
```

East - England (long path)

```
28.5
24.9           .
21.2          .%...     .
18.1          %%%%%..  ...
14.2    A     FFFFFA     AAAA
10.1         FFA
 7.2
 3.6
 1.8
 0.9
 MHZ
 UT 00    06    12    18    24
```

East - central and east coast USA

```
28.5
24.9 .                   .....
21.2 %             ...  .%%%%%
18.1 %..           %%...%%%FF%
14.2     A..... . .FF%%%FA
10.1        FFF%FFFF
 7.2         FFFFFF
 3.6         FFFFFF
 1.8         FFFFFF
 0.9         FFFFFF
 MHZ
 UT 00    06    12    18    24
```

East - west coast USA

```
28.5 ...                     .
24.9 %%%.                ....%
21.2 %%S%               .%%%%%
18.1 SSS%.   . .     ...%%%SSS
14.2     A...%%%.... M%%SSA
10.1        AMMMS%%MMMA
 7.2         MMMSSSMMM
 3.6         MMMSSSMMM
 1.8         MMMSSSMMM
 0.9         MMMSSSMMM
 MHZ
 UT 00    06    12    18    24
```

East - South America

```
28.5
24.9 .......              ....
21.2 %%%%%%%.......      ..%%%
18.1 FFF%FF%%%..%%%..  ..%%FFF
14.2    AAFFFF%%FFFA     AAAA
10.1         FFFA
 7.2          FF
 3.6          FF
 1.8          FF
 0.9          FF
 MHZ
 UT 00    06    12    18    24
```

East - West Indies

```
28.5 .                       .
24.9 ..                  .....
21.2 %..          ...   .%%%%%
18.1 F%.......    %%%...%%%FFF
14.2    A%%%%%....FFFAA
10.1        FF%%%FA
 7.2         FFFFF
 3.6         FFFFF
 1.8         FFFFF
 0.9         FFFFF
 MHZ
 UT 00    06    12    18    24
```

East - Japan

```
28.5 .%%%%%%%  ..            .
24.9 %%MMMMMM...% ...        %
21.2 MMMMMMMM%.%%.%..      ..M
18.1 MMMMMMMM%%MM.%%%     .%%M
14.2 MSSSSMMMSSMM%MFF.... FSSM
10.1         SSMMSMMM%%%%%A
 7.2          SMMSMMMSSSM
 3.6          SMMSMMMSSSM
 1.8          SMMSMMMSSSM
 0.9          SMMSMMMSSSM
 MHZ
 UT 00    06    12    18    24
```

East - central Europe

```
28.5        ...
24.9        %%.....
21.2       .F%%%%%.%
18.1       %FF%%%%%%%
14.2       AFFFFFFFFF%..   ..
10.1            AFFFFF%%%%
 7.2              AFFFFFFF
 3.6               FFFFFF
 1.8               FFFFFF
 0.9               FFFFFF
 MHZ
 UT 00    06    12    18    24
```

East - Middle East

```
28.5     .....
24.9     %%%%%...
21.2    %%F%%%%%%.....
18.1    FFFFFFF%%%%%%..
14.2 A      AFFFFFFFF%%......A
10.1             FFFFFFFFFA
 7.2              FFFFFFFF
 3.6              FFFFFFFF
 1.8              FFFFFFFF
 0.9              FFFFFFFF
 MHZ
 UT 00    06    12    18    24
```

East - North Africa

```
28.5        ..
24.9        %....
21.2       .%%%%%.....
18.1 ..    %FFF%%%%%%%........
14.2 A       AAFFFFFFF%%%%%%%A
10.1                FFFFFFA
 7.2                 FFFFF
 3.6                 FFFFF
 1.8                 FFFFF
 0.9                 FFFFF
 MHZ
 UT 00    06    12    18    24
```

East - West Africa (short path)

```
28.5
24.9         ...
21.2 ...    .%%%..        ....
18.1 %%...  %%%%%%%..    ..%%%
14.2 AA   AAAA     AA%...%FFFA
10.1                   FFF
 7.2                    F
 3.6                    F
 1.8                    F
 0.9                    F
 MHZ
 UT 00    06    12    18    24
```

East - West Africa (long path)

```
28.5 ....                    .
24.9 .....    .......     ....
21.2 %%%%.   .%%%%%%%.. ..%%%%
18.1 F%%%%.  %%%%%%%%%...%%FFF
14.2     A%. FFFFFAAF%%%%FFA
10.1        AF         FA
 7.2
 3.6
 1.8
 0.9
 MHZ
 UT 00    06    12    18    24
```

East - South Africa

```
28.5
24.9       ......
21.2     ..%%%M%%...
18.1    .%MMMMMMMM%%..   .
14.2 .. SSMMMSSSSMMMMM%%.M%%..
10.1                AMMMMMA
 7.2                 MMMMM
 3.6                  MMM
 1.8                  MMM
 0.9                  MMM
 MHZ
 UT 00    06    12    18    24
```

forecaster Jan 1993

LEGEND TO SYMBOLS

•	Propagation is possible, but unlikely at this time and frequency on more than half the days of the month.
%	This frequency/time pair should allow communications on between 50% and 90% of the days of the month.
F	Your best bet: first 'F' mode conditions should apply on at least 90% of days this month for the given time and frequency.
E	Propagation via the 'E layer' expected on up to 90% of days of the month at this time and frequency.
P	A fair mixture: up to 90% chance of a path using 'F mode' and between 50% and 90% probability of an 'E layer' path.
B	A good mixture: up to 90% chance of a path using either 'E layer' or mixed 'F' modes.
M	A mixture of combined 'F' modes — both first and second mode up to 90% of the time.
S	Second 'F' mode conditions should apply on at least 90% of days this month for the given time and frequency.
A	High atmospheric absorption of the signal is likely — better to use a higher band. Too close to the ALF for good HF signals.
X	A complex mixture of modes is likely to apply and could possibly include the second 'E' mode.

West - England (short path)

```
28.5         ....
24.9        .%%%....
21.2        %FF%%%%..
18.1        FFFFF%%%%%.
14.2 ..A     AFFFFFFFF%.......
10.1               FFFFFFFFFF
 7.2                FFFFFFFF
 3.6                FFFFFFFF
 1.8                FFFFFFFF
 0.9                FFFFFFFF
 MHZ
 UT 00    06    12    18    24
```

West - England (long path)

```
28.5
24.9
21.2           %...
18.1           %%%%...
14.2 AA       %FFFF%%A       A
10.1           FA
 7.2
 3.6
 1.8
 0.9
 MHZ
 UT 00    06    12    18    24
```

West - central and east coast USA

```
28.5
24.9                .
21.2 ..             ....   ...
18.1 %.            .%%%....%%%
14.2 A             FFFF%%.%FFA
10.1           %%%%FA
 7.2           FFFFA
 3.6            FFF
 1.8            FFF
 0.9            FFF
 MHZ
 UT 00    06    12    18    24
```

West - west coast USA

```
28.5   .
24.9 ....                    .
21.2 %%%.             .    ..%
18.1 FFF%.            %.. .%%F
14.2       A........ .F%%.%FA
10.1           %%%%%%FF
 7.2           FFFFFFF
 3.6            FFFFFF
 1.8            FFFFFF
 0.9            FFFFFF
 MHZ
 UT 00    06    12    18    24
```

West - South America

```
28.5
24.9
21.2 ...............         .
18.1 %%F%FF%%..%%%%..      ..%
14.2 FFA   AAF%FFFFA     ..%FF
10.1
 7.2
 3.6
 1.8
 0.9
 MHZ
 UT 00    06    12    18    24
```

West - West Indies

```
28.5
24.9
21.2 ..   .      .         ...
18.1 %%......    .%..     .%%%
14.2 AA    A%....%F%%A      AA
10.1           %%F
 7.2            FF
 3.6            F
 1.8            F
 0.9            F
 MHZ
 UT 00    06    12    18    24
```

West - Japan

```
28.5  ..%%%F%..
24.9  %%%MMMM%....
21.2 .MMMMMMM%%...          ..
18.1 %MMMMMMMSS%%%..       .%%
14.2 SMSSSSMMSSSSS%.....  .%SS
10.1           SSSSS%%%%.%S
 7.2            SSSSSSSSS%M
 3.6            SSSSSSSSSSM
 1.8            SSSSSSSSSSM
 0.9            SSSSSSSSSSM
 MHZ
 UT 00    06    12    18    24
```

West - central Europe

```
28.5        .%...
24.9        %%%%....
21.2       .FFF%%%%..
18.1       %FFFFF%%%%.
14.2 ..A     AFFFFFFF%%.......
10.1              FFFFFF%FFFF
 7.2               FFFFFFFFF
 3.6                FFFFFFFF
 1.8                FFFFFFFF
 0.9                FFFFFFFF
 MHZ
 UT 00    06    12    18    24
```

West - Middle East

```
28.5     ..%%%%....
24.9    .%%%M%%%%.....
21.2    %MMMMMMMM%%%%...
18.1    FMMMMMMMMMMM%%%.....
14.2 . .SSSSSMMMMMMMMMM%%%%%..
10.1 A           MMMMMMMMMMMMA
 7.2              MMMMMMMMMM
 3.6               MMMMMMMMM
 1.8               MMMMMMMMM
 0.9               MMMMMMMMM
 MHZ
 UT 00    06    12    18    24
```

West - North Africa

```
28.5        ....
24.9        %%%%...
21.2       .FF%%%%%...
18.1 ...   %FFFFF%%%%%....  ..
14.2 %%%A     AAFFFFFFF%%%..%%
10.1                FFFFFFFFF
 7.2                 FFFFFFF
 3.6                 FFFFFFF
 1.8                 FFFFFFF
 0.9                 FFFFFFF
 MHZ
 UT 00    06    12    18    24
```

West - West Africa (short path)

```
28.5
24.9        ......
21.2 ....   %%%%%%..         .
18.1 %%.....FFF%%%%%...     .%
14.2 FF%A          A%%%%....%F
10.1                   FFFFFF
 7.2                   FFFFF
 3.6                    FFFF
 1.8                    FFFF
 0.9                    FFFF
 MHZ
 UT 00    06    12    18    24
```

West - West Africa (long path)

```
28.5    .
24.9 .....    ...            .
21.2 %%%%..   %%%......    ..%
18.1 FFF%%.  .F%%%%%%%... .%%F
14.2       A.FFFFAAAAFF%%.%A
10.1
 7.2
 3.6
 1.8
 0.9
 MHZ
 UT 00    06    12    18    24
```

West - South Africa

```
28.5
24.9
21.2     ....%%....
18.1    .%%%FMM%%%%...
14.2 ...%MMMMMMMMMMMM%%.......
10.1 SA            SMMMMMMMMMS
 7.2                 MMMMMMM
 3.6                  MMMMMM
 1.8                  MMMMMM
 0.9                  MMMMMM
 MHZ
 UT 00    06    12    18    24
```

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15/9

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VK1 AREA

C-64 family pack, datacassette, MPS-1200 printer Epyscript word processor, games, EC. Cost $1300, asking $400 ono. Christine (06) 286 1043

Yaesu FT-101B with YD-148 desk mic 9000 CDX $350. Mark, VK1WH (06) 258 4010. Licensed amateurs only.

Yaesu FT-77 100W HF xcvr with FP-700 p/sup, spkr, $990 ono. Kenwood 7700 VHF xcvr w/mount $200. Yaesu FT-208R h/hld w/chrgr $220. Hilton, VK1CH (06) 292 8855. Licensed amateurs only.

VK2 AREA

Altron 4 band 3-el mini beam, covers 6, 10, 15 & 20 metre bands, 6-8 dB gain $350. **Wilson** 1000 10M band mobile antenna $80. Ross (018) 29 4510

Amateur Exams: 3rd Sunday each month. Classes 7pm Wednesdays Campbelltown High School, Campbelltown. Theory & CW from Novice to unrestricted. Dave, VK2GDM (046) 27 1025

Antennas: Werner Wulf multiband vert $175. Werner Wulf 10-11m 4-el beam $150. Both EC with insts. Ian, VK2WR (02) 634 7210

Apple II & computer 2 drives 5 ¼" green screen, ham-pak modem & s/wre EC $650. Richard, VK2ERF (042) 96 9869

Batteries: 14 gel cells, 12V 6.5ah Standby. Never used. Were bought for mini-computer. $50 ret, sell for $25 ea or $300 the lot. Alex (02) 625 4322

C-64 computer, monitor, disk drive, joystick w/proc, d/base, s/sheet all manuals A1 cond, 7 amateur radio disks, games, disks, $700, Technical books. VK2CKW (065) 68 6370

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The onus is on you...

Disk drive 5 ¼" to suit Pioneer PC-7 $130. **RGB** monitor $120. Frank, VK2GA (02) 622 8159

Icom IC-R1 scanner. Will swap for Icom IC-24AT or Yaesu FT-790R. Also any info on Hammarlund HQ-110 rx please. Norm, VK2KNC (049) 33 7115

Kenwood TR-9500 multimode 70ch rig $625. Richard, VK2ERF (042) 96 9869. Licensed amateurs only.

Kenwood TS-120S, ext VFO 120, mic MC-50, ATU-30, SP-120 spkr, the lot $850. All will sep. Rod (064) 54 6463. Licensed amateurs only.

Kenwood TS-520S HF xcvr, VFO-520 ext VFO, MC-50 desk mic, all EC with cables, manuals etc $600. John, VK2PJC (06) 236 6263. Licensed amateurs only.

Kenwood TS-820 HF xcvr GC $470. **Yaesu** FT-480R all mode 2m xcvr with cradle as new cond $400. Bruce, VK2WWW (068) 47 1165. Licensed amateurs only.

MFJ 300W Deluxe tuner $150. **MFJ** keyer 11 $30. **Yaesu** FRG-7 comms rcvr $100. **Yaesu** desk mic YD-148 $40. **Emtron** SWR & pwr meter cross needle $50. Tuner is new; unwanted gift. All other items in EC. John, VK2MIV (02) 661 3129

Rotator Ham-4. Also 2-el Q quad 10, 15, 20M. Delta loop 40, 80M EC. Mark Zbylut, VK2GND, PO Box 1609, Hornsby NSW 2077

SSTV converter Robot-400 B&W $350. Frank, VK2GA (02) 397 7279

Tenth annual computer networking conference papers, new, $15. Steve, VK2QZ (02) 476 1845

Wanted: FL-2100B linear amp. Richard, VK2ERF (042) 96 9869

Wanted: Mirage D-24 UHF amp must be in good working order. Frank, VK2GA (02) 397 7279

Wanted: Old Morse keys. Ian, VK2WR (02) 634 7210

Wanted: Uniden 10M xcvr. Frank, VK2GA (02) 622 8159

Yaesu FRG-7700 rcvr in GC. 150kHz-30MHz with ant tuner & preselector, inst manual plus Aust-wide HF freq register $500 ono. Neville (065) 85 2129

WEATHER FAX PROGRAMS

RADFAX2 is a high resolution shortwave weather fax receiving, displaying & printing program for the IBM XT or AT computer with a CGA, EGA, VGA or Hercules card (please state which). Programs are $35 each plus $3 postage, & are supplied on 5.25" or 3.5" disk (please state which) plus full documentation. Programs are available only from: M. Delahunty, 42 Villiers St, New Farm Qld 4005. Ph. (07) 358 2785

Also **SATFAX** vers 5.0, (EGA & VGA) $45, & **MAXISAT** (1024x768x16/256 SVGA) $75 which are weather satellite picture receiving & displaying programs, add $3 P&H.

Yaesu FT-23R 2M HT EC $349 ono. **Also** 2-18V 20amp power transformers new $50ea ono. VK2GTD (049) 77 1507 AH

Yaesu FT-23R 2M HT,. hardly used, 12mths warr, modified for packet $320. **Also** Realistic PRO-2003 scanner, 7 bands from 68MHz-512MHz, 50 mems $180. Both with manuals, will pay postage. Carl, VK2JJM (066) 57 5207. Transmitting gear sold to licensed amateurs only.

Yaesu FT-707 with h/mic, DC pwr cable, owner's manual, mobile bckt $650. Greg, VK2AVI (048) 21 1272. Licensed amateurs only.

VK3 AREA

Antenna tuner **MFJ**-949D with inbuilt 300W dummy load. New in box $250 ono. Damien, VK3CDI (054) 27 3121

Books: recent and current amateur books of every description at half bookshop price. Send SASE for full list.

Yaesu FT-290R mkII all-mode 2M xcvr with rare FL2025 matching 25 watt amp $700 or offer. **Pac-Comm** TNC-320 dual-speed VHF/HF packet TNC $300. **Icom** IC-2GA 2M HT, near new $300 or offer. **Icom** IC-475A 70cm all-mode base xcvr (best there is) $1500 or make an offer. Jan, VK3OK (03) 842 3754 after 1800k only. Transmitting gear sold to licensed amateurs only.

Carphones, computer & Audio tape equip for sale. Please forward SASE for list. John Wickham VK3KGP 3/144 Danks St, Albert Park Vic 3206. Transmitting gear sold to licensed amateurs only.

Datong model F67 audio filter serial No. 4067 as new $110. Posted or exchange for Datong morse tutor. John, VK3KVQ (055) 23 1025

DECEASED ESTATE VK3RE: Kenwood TL-922 lin amp c/w tubes, manuals, orig pack, S/N 750056 $1950. Kenwood TS-820S xcvr. Manual orig pack, S/N 740782 $850. Kenwood SP-820 spkr box C/W filters S/N 821344, sell with xcvr. $85. Yaesu FF-500DK Lo pass filter $25. Icom-701 xcvr C/W Icom 701 P/s. Base & mobile mics. Manuals S/N 980002371, 7801310 Webster band spanner ant & spring base & mobile whips & mag mount $950. Kyoritsu SWR meter, K-109 $25, Kaise Electric low Ohm meter 0-5, 0-25 Ohms 2% acc, c/w leads case $25. Nidac PPS-3 alarm, pwr supply $25. Dummy load HRL-250 12' long $50. DSI 3600A, Freg counter, manual S/n 7984 $50. Jaran servo co fan motor 4.5" s'ware cast al. Model CU52B3 208-230V 14-12W 50-60Jz. 1" deep $20. 2xIRC 5000 Ohm 8w WW resistors type HO tol 2% trop/coat new c/w mount bckts 12' long. $10ea. Richard Allak twin cone Hi-Fi spk type CG-8T 8 Ohms new boxed $30, National stereo headphones Hi-Fi mod EAH-65 8 OHm $25. Tower crank-up 3 sect. H/duty gal ext 70'. Bot 12" tri tiltover base plate mounted prop. Pitch motor mast 5-el incl 50' RG8 150'. All other rope guys 1 set (top) poly prop rope, all very long. Mounted pwr traky in weather proof box $1500. HyGain THGDX triband beam Balun manual $350. Offers considered on all above. John, VK3HW (053) 32 4011. Transmitting gear sold to licensed amateurs only.

DECEASED ESTATE: VK3QZ Icom IC-751, PS-35, AT-500 & SM-8 mic, $2450. IC-25A $350. **Kenwood** TS-120S, AT-120 & DFC-230 $750. **ATN**-13-30-8 log/P antenna $550. Tom, VK3XBG (051) 94 2240. Transmitting gear sold to lic amateurs.

DRSI PC*Packet radio adaptor type 1. $250. **Selonic** SPL-410 six den flat bed A3 plotter HP7475 compatible EC $450. Brett, VK3JHP (03) 598 9588

SSTV RECEIVE SCANCONVERTER KIT

Heard the SSTV on 14.230 MHz and wished you could see it? Build this low-priced receive scanconverter and decode both B and W and color pictures. Displays them as a high resolution (256 lines X 256 pix X 64 shades) monochrome picture on a standard TV with video input.

KIT 1 PCB and documentation $80 incl. post.

KIT 2 PCB and documentation and all components (excludes case) $200 incl post.

Send cheque or SASE for more info to LM Williams, 14 Powell St, Bungendore NSW 2621

Hustler mobile antennas 1/4 wave 6m, 80m, 40m, 20m, 15m, 10m resonators $130 lot. UHF 6dB base aerial. As new $80. Graeme, VK3MIL (03) 752 3500

Kenwood TS-930S HF xcvr GC with h/mic & manual $1600 also 45' tilt-over tower with 4-el 10m cubical quad $550. Ron (054) 39 7488

Oskerblock SWR/200 $80. Oskerblock SWR/435 $80. All in EC manuals etc. Paul, VK3EPD (059) 83 1771

QRM-free location! 3BR house located in Mt Beauty, NE Victoria. Skiing, bushwalking, trout fishing... mecca! Tower with rotator fitted. Shack adjoins house $49,000. VK3DUG (057) 57 2814

Simplex auto Morse sender ex-PMG. Swap Sanyo R-2 reel for 2m xcvr which goes! Jack, VK3EK (03) 386 2795

STC 151 low band xcvrs suit 6m conversion $30. Power supply 13.8V 10A $130. Joe (03) 330 2260. Licensed amateurs only.

Tait UHF Mod/96 xtals removed 6 chnl 25/5watts. David (052) 75 3104

Tokyo Hy-power HF linear amp. HL-1KGX new in orig carton, manual plus spare pair 4X150A $1000 ono. Will deliver VK3 or VK5. Bob, VK3EJQ (053) 92 2276. Licensed amateurs only.

Various printer serial dot-matrix $200 ono. Intercom, wired $5, Intercom FM DSE slight retune needed $20. Altronics stereo preamp kit built, working $15. 3x disk boxes $1ea, 12UDC muffin fan w/filter $5 24UDC 6" Muffin fan $7, 3x BNC plugs new $1ea 1x N connector $1. Sony stereo cassette recorder in vinyl case with spkrs mic & cables $30 ono. 5.25" 1.2m disks 50c ea or $12 for 30. 1x compact disk storage box 2 drawer $5 1x 3 drawer cassette storage box $3. Wenlock, strictly after 1800 only. VK3YWB (03) 282 6284

VK Powermaster 25amp peak complete $150 **Philips** FM 828 4 repeaters 8 chnl 50 crystals fitted works very well $170. Danny, (053) 34 2818. Transmitting gear sold to licensed amateurs only.

Wanted: Circuit diagram & service manuals for circuit library for amateur radio, CB radio, comms & scanner equip. Phone or write for more info. Martin Melville (03) 364 9365or write PO Box 535, Sunshine 3020

CAMPERVAN HOLIDAYS IN ZL

Discover ZL & travel in two- or four-berth Campervan, all **fully equipped with amateur radio gear** QRV on HF & 2M FM. Very competitive rates and friendly service by OM **Dieter, ZL2QB** & his YL **Brigitta**.

For more information phone or fax (same number):
0011 64 3 543 2022

Wanted: DSE radio direction finder kit. Cat No K6345 will accept kit, part or fully built, or even drawings & parts list. Martin, VK3FMD (03) 580 6500

Wanted: PRC-25 military xcvr, pref in GC. Damien, VK3CDI (054) 27 3121

Wanted: Satellite KU/C band secondhand rcvr with dual-band feedhorn. Wanted mods for Plessey MTR-43 lowband 6m, mods. Graeme, VK3MIL (03) 752 3500

Yaesu FC-102 antenna tuner with manual, takes five antennas plus 1kW power $275. **Adonis** compression desk mike with scanning kit. Frank, VK3CFJ (03) 877 5607

Yaesu FRG-9600 all band all mode VHF/UHF scanning rcvr with all accss, manual & box Pristine cond. $700. VK3DVY (052) 21 6804

Yaesu FT-747GX EC checked by DSE $1000 neg. Gordon, VK3VFK (050) 21 1452. Licensed amateurs only.

Yaesu FT-77 HF xcvr $650 **Yaesu** FTDX400 xcvr $120. **Icom** IC-701 & P/S xcvr $500 **KW**-500HF linear $200 **VK** power master 20amp P/S $250. **Kenwood** AT-230 tuner $220. Doug, VK3DN (03) 726 8544. Transmitting gear sold to licensed amateurs only.

VK4 AREA

JRC NRD-525 rcvr as new with h/book $1800 ono. (074) 44 0856

Yaesu FRG-7700 GC $350. **Yaesu** desk mic YD-148 $30. Three 6146B (used but OK) $20. Post freight extra. Ken, VK4MKP (074) 44 5120

Yaesu FT-747GX $1000. **Yaesu** FT-411 & FNB-11 & headset & mobile whip $400 both units in GC John, VK4MBN (07) 892 4654. Licensed amateurs only.

Yaesu FT-757 GXII all mode HF xcvr in PC, still under warr, very little use, with orig car-

... CLASSIFIEDS ... CLASSIFIEDS ... CLASSIFIEDS...

ton & handbook. $1250 Adam, VK4KCC (07) 359 5844. Licensed amateurs only.

Scanner-freq database for Amiga computers. Queensland database plus program to read same $30 per 2 disk set posted 1 meg mem req blank disks 3.5 inch DSDD $10 per box of 10 disks 10 or more boxes $9.50 per box - 45 or more $9.00 per box - 90 plus boxes $8.50 ea. Herb Marriage, VK4KM Bonds Road, Wooroolin QLD. 4608 (071) 64 2202

Amiga 2000 computer 4 meg ram 7 disks. Comm progs, good order $800. Icom 735 xcvr $1300. Yaesu auto antenna tuner FC-757AT $500. Herb, VK4KM (071) 64 2202

Scanner freq database for Amiga computers. Queensland data base plus program to read same $30 per 2 disk set, posted. 1 meg mem req blank disks 3.5inch DSDD $10 per box of 10 disks, 10 or more boxes $9.50 per box, 45 or more $9 per box, 90 plus boxes $8.50 ea. Herb Marriage Bonds Rd Wooroolin 4608 (071) 64 2202

Yaesu FT-411E 2m HT C/W AC chrgr, DC car adaptor/chrgr (PA6) & base antenna $430. Adam, VK4KCC (07) 359 5844. Licensed amateurs only.

Wanted: Manuals for Eddystone rcvrs model 990R mode 990S. Doug Walsh 30 Howlett St Townsville 4812

Mast 42' Telescopic 4-staged aluminium mast & aerial. Adjustable tripod base guy ropes, pegs, earth peg, lead (1kW 2-30MHz) ex Army EC, clear title guaranteed $1500. (07) 266 2275

Wanted: Crystals for Yaesu FT-75B all bands, especially Novice segments. Tony Dore VK4KJD (07) 344 1500 or 11 Goorong St, Sunnybank Hills, Brisbane 4107

VK5 AREA

Icom IC-751 HF xcvr with optional filters $1350. **Icom** SM-8 desk mike $100. **Sony** ICF-SW7600 port rcvr $230 all in EC. Arn, VK5XV (08) 298 7029. Transmitting gear sold to licensed amateurs only.

Wanted: Digital display for IC-22S (or freq counter up to 150MHz) kit or project in any cond would be considered. Laurie, VK5FH (085) 56 2253

Log Periodic 8-el 10-30MHz boom 15' designed by VK5RQ $400. Bob, VK5HW (088) 21 2147

Kenwood TS-520 $400 ono. **Realistic** Pro-202 scanner & antenna $300 ono. Two **TRS-80** computers $150 ea. Diskdrives & printers incl in price. All items in working cond. Ray, VK5BRS (085) 62 3650. Transmitting gear sold to licensed amateurs only.

VK6 AREA

Yaesu FT-26 HT $330. Two weeks old. Also 4-el cubical quad 10m-15m help to take down $400. Dave, VK6PPE (09) 398 3670. Transmitting gear sold to licensed amateurs only.

Kenwood TS-430S HF xcvr, PS-430 power supply, AT-230 antenna tuner, duoband beam 10/15 $1500 the lot ono. George, VK6TI (097) 91 2334. Transmitting gear sold to licensed amateurs only.

Wanted: Mizuho KX-3 short wave antenna tuner. Jeff, (09) 277 3803

Alinco DR-590T dualband FM xcvr, wideband receive, many features, $750 ono. **Also** PK-88 TNC plus cables, manual $250 ono as new. Earle, VK6EEF (09) 279 3452. Transmitting gear sold to licensed amateurs only.

All phone numbers are after hours unless otherwise noted.

QSL CARDS

QSL cards urgently needed for WIA historical collection. Old & modern cards welcome. Parcel post costs refunded contact Ken, VK3TL 4 Sunrise Rd, Montrose Vic. 3763 (03) 728 5350

VK7 AREA

Kenwood TS-940S HF xcvr with mic, books, AM SSB filters, inbuilt ATU voice board in orig box. Daryl VK7OMJ (002) 64 1530

Surplus new valves four 6HF5 $50, two QQE03/20 $30 thirty 6BH6 $8ea, twenty 6AK5 $5ea twenty 6AU6A $5 ea. Tony Stevens, VK7NAU (003) 39 1378 or write PO Box 2050, Launceston Tas.

Wanted: Daiwa cross needle CN520 swr pwr meter will swap MV-3 Emtron vert antenna as new. Athol, VK7ZW (004) 26 1238

OVERSEAS

Russian-English phrases for amateur radio. WCHJK's famous tape & 20 page booklet. Send $20 to ZL2BS (T.Ward) P.O. Box 4127 New Plymouth, New Zealand 4615 postpaid

M/W **BCB loop**, made via home workshop more details for two IRCs. Write Mike Evans, 120 Loughton Way, Buckhurst Hill, Essex 1G9-6AR England.

COMPUTER SOFTWARE FOR PCs

Amateur software by G4BMK for PCs. Multimode program for IBM PCs & clones. Amtor $70. RTTY $45. CW $45. Fax $45, SSTV $35. Audio tuner (with any of the above) $20. Discounts for multiple combinations. Tandy CoCo software for Packet, RTTY, Amtor, CW & SSTV also available. Details from Dave Ralph, VK4ASB, 23 Darwin St, Aspley, QLD. 4034. Tel. (07) 263 8689 AH.

HF ANTENNAS

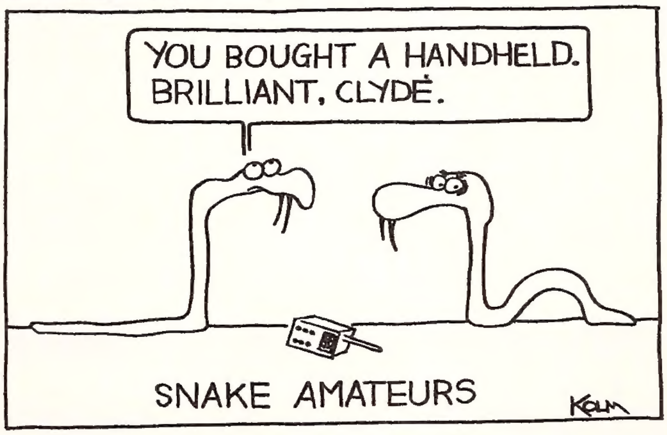
New design Log-Yagi, with eight elements on an 18ft boom. Covers 18 MHz to 30MHz with 9.5 dBd gain. No traps, all stainless steel hardware, incl boom to mastmount. Balun supplied for a 60 ohm input. The latest in high performange beams. Computer printout & Polar diagrams supplied. Monoband model also available.

For further information call John, VK2AU, on (02) 636 6061

QSL CARDS

QSL cards, white or colored, pre-printed or fully personalised with callsign, operator's name, QTH, station equipment, QSO panel, with or without logo. Top quality cards at best prices — eg. 200 fully-personalised cards for just $38.40.

Send 90¢ stamp to **BINT Services**, PO Box 323, Cheltenham 3192 for samples and prices.

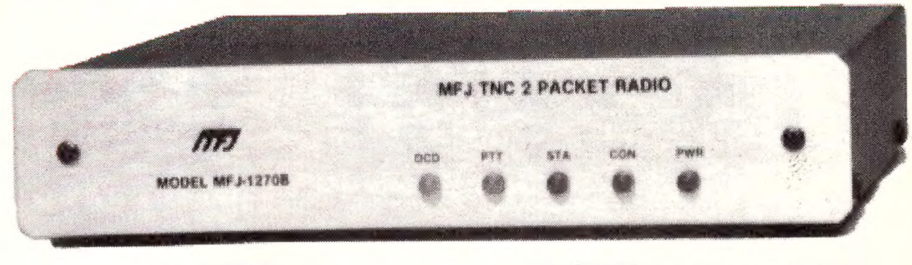

YOU BOUGHT A HANDHELD. BRILLIANT, CLYDE.
SNAKE AMATEURS

MFJ TNCs for HF/VHF packet

The MFJ1270B super TNC-2 clone has a world wide reputation as the most reliable packet TNC in the world! Thousands are in use as digipeaters, nodes, mini-BBS and in BBS systems as well as commercial applications working 24 hours per day — many work for years without a failure.

NEW *ENHANCED* MAILBOX

- Expandible to 32 K, 128K or 512K
- Separate callsign for mailbox
- Mailbox stays on during packet connects
- Auto forward and reverse mail forwarding
- Remote SYSOP access
- SYSOP paging
- Chat mode, mailbox C-text
- "HAS MAIL" LED indicator



MFJ1270B **$269**

MFJ1274 with HF tuning indicator **$299**

The MFJ1270B has won for itself an enviable reputation as the most reliable packet data controller in the world! Why? Because it has proven itself in digipeaters, nodes, BBSs and many commercial systems in Australia and overseas—many have worked for years without a single failure.

Best value for money

MFJ packet TNCs may not be the cheapest on the market, but they offer you great value for money with a range of features and facilities just not available with others.

Fully TAPR TNC-2 compatible

With an MFJ packet TNC you get FULL TAPR TNC-2 compatibility — all software and hardware designed for the TNC-2 standard will work without modification.

You get NET/ROM compatibility that can turn your TNC into a level three or four packet switch. They are also compatible with ROSE, giving you another networking option.

VHF and HF operation

With the MFJ1274 you get a high resolution tuning indicator that allows you to easily use it for high performance HF packet operation with true DCD for reliable operation.

Simple power requirements

Allow the MFJ TNCs to be used with any nominal 12V DC power source. They can also be powered from the accessory connector on many radios.

New *ENHANCED* personal mailbox

The new, enhanced, personal mailbox is really a mini-BBS. It gives you a dedicated call sign for the mailbox. Now you can receive mail while you continue to operate packet. This new mailbox will also automatically forward, or reverse forward, mail to and from other bulletin board systems. Special new commands make it easy to forward through NET/ROM, ROSE and KA-node systems for greatest flexibility. New TIMED COMMAND function allows for easy hourly forwarding or reverse forwarding.

A new "HAS MAIL" LED function blinks when you have mail waiting. More features include: remote SYSOP access, SYSOP paging, mailbox C-TEXT, chat mode and others not available in any other TNC or multi-mode data controller.

Option kits allow the mailbox memory to be expanded to 32K, 128K or 512K.

REMOTE HEARD LIST access for mailbox users is great for seeing who is active in the area.

OTHER FEATURES

- WeFAX mode for weather maps
- 2400 & 9600bps modem options
- KISS interface for TCP/IP & MSYS
- MFJ Host Mode for software developers
- PRIACK anti-collision technology
- QRA - who is there? command

MFJ TNC/Mic switch

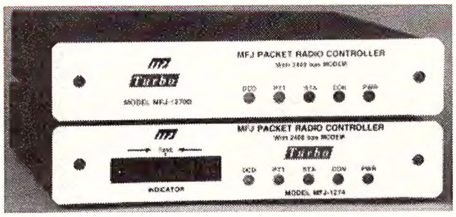
This popular accessory for packet and multimode controllers allows you to switch easily between your microphone and the controller without having to unplug cables or assemble special cables.

Plug-in jumpers allow you to configure the MFJ1272B for virtually any radio having an 8 pin microphone connector. Some require a speaker output cable. Has provision for external speaker for monitoring.

MFJ1272B for MFJ & Paccom TNCs	$76.80
MFJ1272BX for AEA PK232	$87.90
MFJ1272BYV for KAM VHF port	$87.90
MFJ1272BYH for KAM HF port	$87.90
MFJ1272BZ for AEA PK88	$87.90

MFJ TNC upgrades and options

2400bps 'Standard' controllers



All **MFJ** controllers are available 'off the shelf' with 2400 bps options, allowing you to operate 300, 1200 and 2400 bps packet simply and easily. To get these high performance controllers just order the **TURBO** option version!

MFJ1270BT 2400 bps TNC	$366
MFJ1274T 2400bps TNC	$399

The **MFJ2400** modem option can be fitted to any MFJ or other TNC-2 type data controller. All instructions and wiring supplied.

MFJ2400 modem card	$170
MFJ2400X special for AEA PK-232	$170

Mailbox expansion kits

Your current MFJ or other TNC-2 type TNC can be fitted with an MFJ mailbox expansion kit, which includes the new 1.2.9X firmware with all of the standard features plus expanded memory support.

MFJ47A 32K RAM expansion kit	$109.90
MFJ47B 128K RAM expansion kit	$153.90
MFJ47C 512K RAM expansion kit	$439.90

9600bps modems

For satellite and terrestrial operation.

MFJ9600 modem add-in kit	$199

MFJ is represented exclusively in Australia by Stewart Electronics

Stewart Electronic Components Pty. Ltd.

44 Stafford Street Huntingdale : PO Box 281 Oakleigh 3166
ACN 004 518 898
Phone (03)543-3733
FAX (03)543-7238
BankCard, Visa, MasterCard welcome

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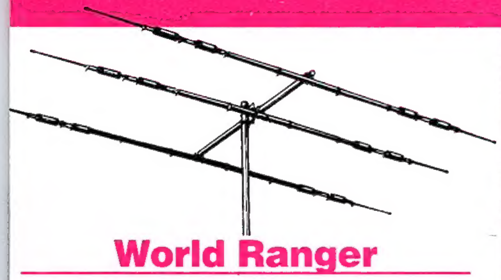
cushcraft
CORPORATION

HF Vertical and beam antennas



World Ranger

Multiband YAGIS for 10,12,15,17, 20,30 & 40 mtrs

Our three and four element triband beams provide the versatility and performance you need for reliable communications around the world. Cushcraft's World Rangers are made to last with 6063-T832 aluminium tubing, weatherproof traps, stainless steel hardware and fibreglass insulators. They are designed with fewer parts for easier assembly, lower weight and less windload.

The add-on kits shown below can be used to add 30 or 40 metres to the A3S and A4S or 30 metres to the unique WARC band A3WS dual band beam.

Model	A4S	A3S	A3WS
Frequency	28,21,14	28,21,14	24,18
Number of elements	4	3	3
Forward gain, dBd	8.9	8	8
Front to back ratio, dB	16	14	14
Power, watts PEP	2000	2000	2000
Boom length, metres	5.48	4.27	4.27
Longest element, mtrs	9.75	8.45	7.66
Turning radius, mtrs	5.49	4.72	4.4
Max mast size, mm	50	50	50
Wind load, square metres	.51	.47	.38
Weight, kg	16.8	12.3	10.24
Price (inc tax)	$1043	$867	$683

World Ranger 30 & 40 mtr add-on kits

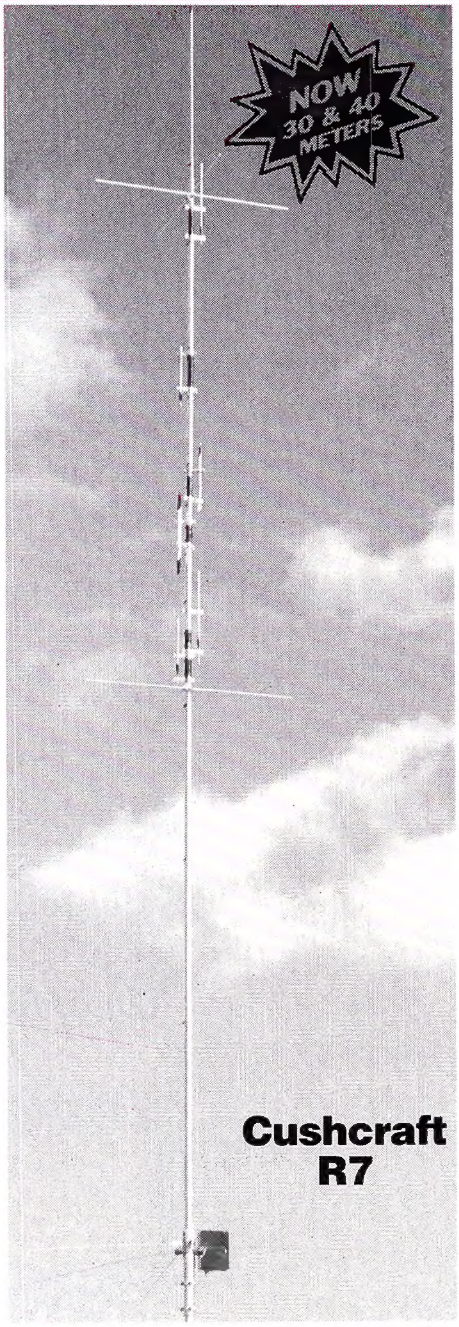
Model	A743		A744		A103
Frequency, MHz	7	10	7	10	10
Driven element length	10.72	8.66	10.72	8.66	9.8
Wind load square metres	.05	.03	.05	.03	.05
Bandwidth, kHz	125	150	125	150	250
Power, watts PEP	2000	2000	2000	2000	2000
Weight, kg	1.6	1.05	1.6	1.05	1.5
Price (inc tax)	$273		$273		$273

ROTATABLE DIPOLES

Model	D40	D4	D3	D3W
Frequency	7	28,21,14,7*	28,21,14	24,18,10
Bandwidth, kHz	200	>350*	>500	>200
Power, watts PEP	2000	2000	2000	2000
Length, metres	12.88	10.92	7.86	10.37
Wind load, square metres	.12	.12	.08	.08
Weight, kg	5.5	5.9	4.1	5
Price (inc tax)	$507	$566	$419	$429

*>125kHz @7MHz

Cushcraft rotatable dipoles come in four models, a single bander for 40 metres, three and four banders as well as the new D3W for three WARC bands. Their size means they can be mounted high above trees for better performance than a wire dipole without the worry of a tribander on a tall mast or tower.



Multiband HF verticals

Half-wave verticals for 7,10,14,18,21,24,28 MHz

R5 & R7

IT'S THE ONE YOU'VE ASKED FOR! Amateur radio's most popular vertical antenna design now gives you **30 & 40** metres **WITH NO GROUND RADIALS!** Only 6.9 metres (22.5 feet) tall, the **R7**s small footprint and ground independence gives you mount anywhere flexibility. Ideal for confined spaces and unobtrusive in home units, the **R5** and **R7** offer simple assembly (it takes about twenty minutes) automatic frequency selection and only 7 short (1 metre) counterpoise rods mean you worry about DXing, contesting or rag-chewing, not what the neighbours or XYL think!

Convenience is only one reason to own a Cushcraft R5 or R7 vertical, the main reason is performance. The only connection to your rig is a single coax. No band switching, no remote tuning and you can have amateur radio's best performance to size ratio antenna on 30 & 40 metres, a total of SEVEN bands today!

Model	R5	R7
Frequency	28,24,21,18,14	28,24,21,18,14,10,7
Gain, dBi	3	3
Electrical length	Half-wave	Half-wave
SWR 2:1 bandwidth	Full band	Full band
Power, watts PEP	1800	1800
Radiation angle	16°	16°
Height, metres	5.2	6.9
Max mast size, mm	45	45
Wind load, square mtr	.13	.21
Weight, kg	4	5.6
Price (inc tax)	$620	$870

HF Verticals

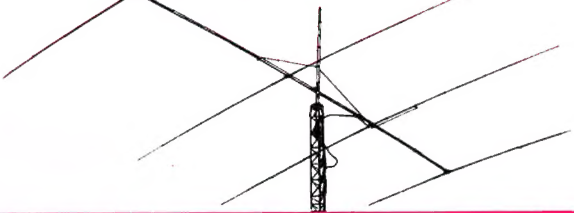
80 - 10 metres

As well as the popular and very sucessful half-wave verticals the R5 and R7, Cushcraft offers three, five and eight band quarter wave verticals with high quality, heavy duty construction with all stainless steel hardware. These compact antennas are ideal wherever you have the space for ground radials but not for a beam antenna.

For use with any of these antennas the APR18 radial kit consists of 6 pre-cut radial assemblies with connecting lugs all ready to attach to the

Model	AV3	AV5	AP8
Frequency	28,21,14	28,21,14,7,3.5	28,24,21,18 14,10,7
Gain, dBi	3	3	3
Electrical length	1/4-wave	1/4-wave	1/4-wave
SWR 2:1 bandwidth	Full band	Full band 80M>70kHz	Full band 40M>150kHz 80M>60kHz
Power, watts PEP	2000	2000	2000
Radiation angle	18°	18°	18°
Height, metres	4.2	7.4	7.92
Max mast size, mm	42	42	42
Weight, kg	2.3	3.65	4.23
Wind load, square mtr	.10	.19	14
Radials required	Normally yes.		
Radial kit to suit	APR-18 (set of 6)		
Price (inc tax)	$205	$380	$453

Skywalker Monoband Yagis



Model	10-4CD	10-3CD	TEN-3	15-4CD	15-3CD	20-4CD	20-3CD	40-2CD
Frequency	28-29.7	28-29.7	28-29.7	21-21.45	21-21.45	14-14.35	14-14.35	7-7.3
Number of elements	4	3	3	4	3	4	3	2
Forward gain, dBd	10	8	8	10	8	10	8	5.5
Front to back ratio, dB	30	30	25	30	30	30	30	20
Power, watts PEP	2000	2000	2000	2000	2000	2000	2000	2000
Boom length, metres	4.88	3.05	2.44	6.10	4.27	9.75	6.1	6.9
Longest element, mtrs	5.34	5.38	5.49	7.11	7.06	11.0	10.96	12.9
Turning radius, mtrs	3.5	3.05	3.0	4.72	4.11	7.2	6.1	7.29
Max mast size, mm	50	50	50	50	50	50	50	50
Wind load, square mtr	.29	.21	.20	.42	.32	.75	.51	.57
Weight, kg	11.4	5	4.5	11.4	9.1	25	13.7	20
Price (inc tax)	$507	$390	$264	$605	$517	$1072	$750	$1072

Stewart Electronic Components Pty. Ltd.

44 Stafford Street Huntingdale : PO Box 281 Oakleigh 3166
BankCard, Visa, MasterCard welcome

ACN 004 518 898

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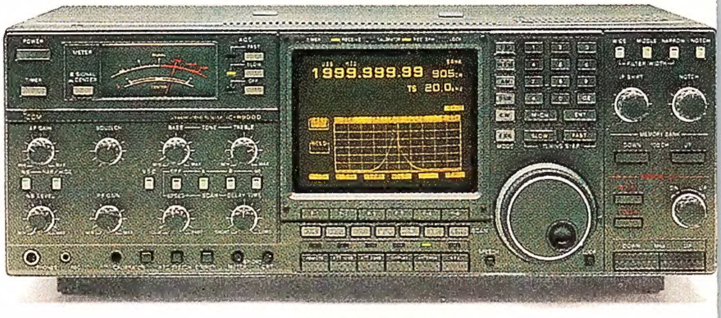
Icom's impressive range of receivers lets you listen to more frequencies, across the band and around the world.

Starting with one of the smallest receivers ever produced, the IC-R1 covers 100kHz - 1300MHz (2 ~ 905MHz guaranteed), with AM, FM and Wide FM modes, Dual Frequency Selection and 100 memories.

The IC-R72 receives 30kHz - 30MHz (100 kHZ ~ 30 MHz guaranteed) in SSB, AM and CW modes and comes with numerous impressive features, including Icom's DDS System to improve Carrier to Noise Ratio characteristics and optional FM mode.



IC-R9000

With an Icom receiver, the world is as wide as your band

The mobile IC-R100 is packed with powerful features, and covers the 100kHz - 1800 MHz (500 kHz ~ 1800 MHz guaranteed) range in AM, FM, wide FM modes with multi-function scanning and 100 memories with 20 scan edge channels.

While the IC-R7100 covers from 25 ~ 2000 MHz in SSB, AM, FM, wide FM modes, optional TV and FM stereo adaptor, with 900 memory channels, sophisticated timer functions and multiple scan functions.

The top of the range IC-R9000 expands your listening horizons, covering 100 kHz ~ 1999.8 MHz in all modes and featuring Icom's unique CRT display, intelligent scan functions and an amazing 1000 memory channels, in a unit that delivers superb high frequency stability, even in the GHz range.

So tune in to the ones that professional listeners use, from the wide range of Icom wide band receivers.

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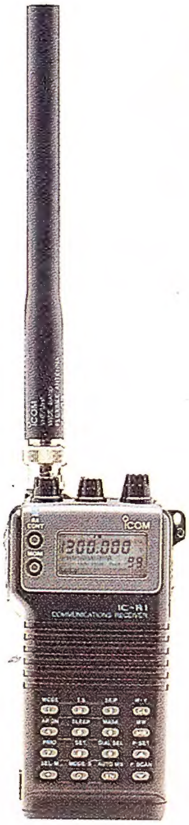
IC-R7100

IC-R100

IC-R72



IC-R1

ICOM Australia's warranty is only applicable to products purchased from their authorised Australian Dealers.

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